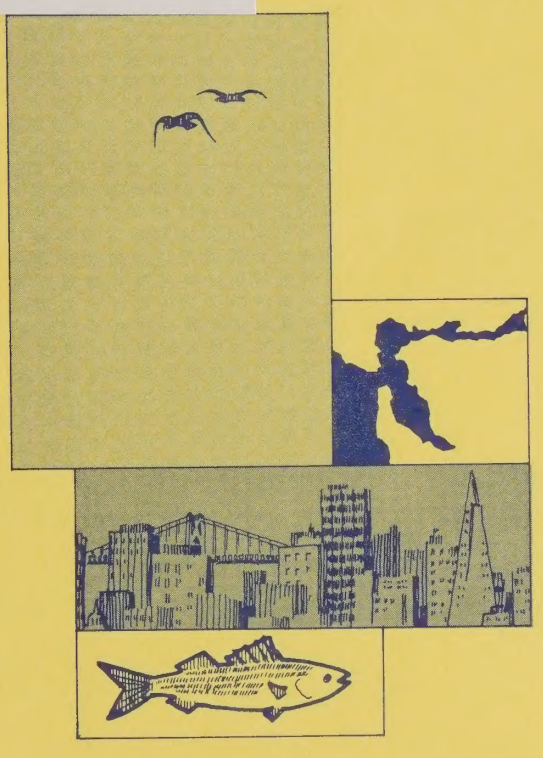


San Francisco Bay Area

Environmental Management Plan

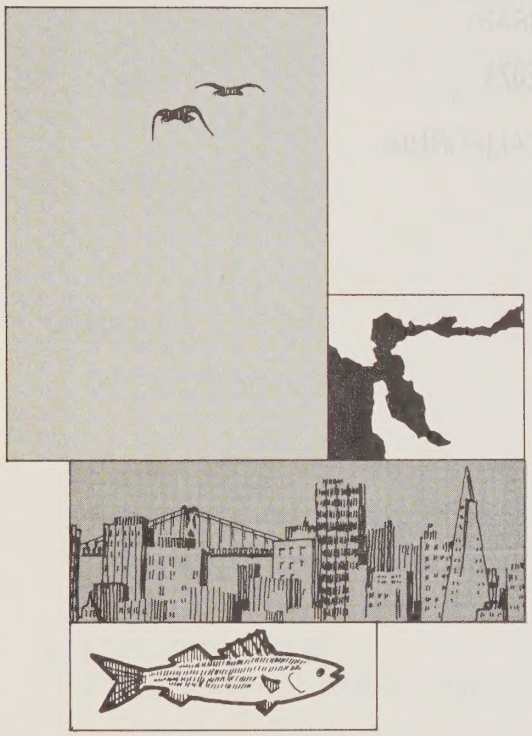
1979 Update

First Annual Report on Environmental Management Progress

August 1979

ASSOCIATION OF BAY AREA GOVERNMENTS

ABAG



San Francisco Bay Area

Environmental Management Plan

1979 Update

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SAN FRANCISCO BAY AREA
ENVIRONMENTAL MANAGEMENT PLAN

1979 UPDATE/First Annual Report on
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Chapter 1
INTRODUCTION

The Environmental Management Plan (EMP) for the San Francisco Bay Area was adopted by the General Assembly of the Association of Bay Area Governments (ABAG) in June 1978. This report is the first annual report on environmental management progress in the Bay Area.

BACKGROUND

The 1978 Bay Area Environmental Management Plan was prepared by the ABAG with assistance from the Bay Area Air Quality Management District (BAAQMD), the Metropolitan Transportation Commission (MTC) and the San Francisco Bay Regional Water Quality Control Board (RWQCB). The Environmental Management Plan was prepared to meet the requirements of the Clean Air Act Amendments of 1970 and 1977, the Federal Water Pollution Control Act Amendments of 1972 and 1977, as well as other Federal and State Laws.

The preparation of the initial plan was under the direction of a 46-member Environmental Management Task Force (EMTF), a policy advisory body to the ABAG Regional Planning Committee (RPC) and Executive Board. The draft Environmental Management plan was released for review by affected local, regional, State, and Federal agencies and the public in December 1977. The draft plan presented a series of recommended actions that showed how the region could solve the air, water and solid waste problems in the Bay Area, and in so doing, meet key Federal and State

standards. During the course of the plan preparation, emphasis was placed on integration of the four planning elements: air and water quality, water supply, and solid waste management. The integrated approach assured that all of the four planning elements used common data bases, and that decisions to meet goals for one element would not impair efforts to meet the objectives of other plan elements. In addition, it was most cost-effective to serve the public participation and local involvement aspects of the environmental program by a single program.

After its release for public review, the draft plan was modified. The changes were necessary to produce a publicly acceptable and implementable Environmental Management Plan. During the process, the plan was also revised to partially reflect the additional requirements resulting from the passage of the Clean Air Act Amendments of 1977 and the Federal Water Pollution Control Act Amendments of 1977. The modified plan was formally adopted by city and county representatives of ABAG's General Assembly June 1978. The locally adopted plan was subsequently submitted to State and Federal agencies for review and approval.

As of July 1979, the Bay Area's water quality plan had been approved by the State and the Environmental Protection Agency (EPA). The 1979 Bay Area Air Quality Plan was modified by the ABAG Executive Board on May 17, 1979, and subsequently submitted to the California Air Resources Board. The California Air Resources Board has accepted the modified plan, and it is being reviewed by the EPA. The regional solid waste management plan has been submitted to the State for review and approval.

The water supply plan did not require a formal approval from the State or EPA, although two of its policies were acted upon.

PURPOSES OF THIS REPORT

This report describes the environmental conditions in the Bay Area, and summarizes the on-going environmental and energy resources planning activities at ABAG for the period from 1975 to 1978. Specifically, the objectives of the report include:

- summarizing progress in air and water quality improvement, water supply and solid waste management, as well as energy resources planning.

- updating the current status of the four component plans of the Bay Area's EMP.

- highlighting the significant environmental and energy resources planning activities to be undertaken in the coming year, and related Federal and State legislative activities.

- describing intergovernmental aspects of environmental decision-making.

REPORT ORGANIZATION

Chapter 2 describes the current status of environmental planning in the region. It covers air quality, solid waste management, water quality and water supply. Chapter 3 describes the region's energy situation,

and describes how energy considerations can be incorporated in environmental management.

Chapter 4 describes the technical issues involved in environmental management planning and relating environmental control programs with other objectives of public policy, such as housing and economic development. Chapter 5 covers institutional issues, intergovernmental relations and public participation.

Chapter 2
UPDATING THE ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan adopted in June 1978 by ABAG's General Assembly contains four separate management plans. The plans cover air and water quality, solid waste management and water supply.

The separate management plans were prepared independently (although under a single environmental management program guided by a single policy body). The separate plans were then made consistent to ensure that attainment of certain environmental objectives didn't interface with efforts to meet other environmental objectives. The draft plan was kept consistent through the lengthy public review, modification and approval process.

The remainder of this chapter updates the individual management plans contained in the EMP.

AIR QUALITY MANAGEMENT

CURRENT CONDITIONS

The Environmental Management Plan included a review of historical air quality trends from the early 1960s to 1975. This section updates the air quality conditions and trends in the Bay Area from 1975 to 1978. The established Federal and California ambient air quality standards are shown in Table 2-1. Tables 2-2 to 2-5 summarize air quality in the Bay Area by monitoring station and contaminant for 1975, 1976, 1977, and 1978, respectively. The trends for each pollutant during the 1975-1978 period are described below.

Photochemical Oxidant Concentrations

Figure 2-1 summarizes the annual total number of days exceeding the former Federal oxidant standard of 0.08 parts per million in the Bay Area for the 1975-1978 period. In general, oxidant levels showed a downward trend from the early 1970s to 1977. The number of days exceeding the Federal 0.08 ppm 1-hour standard averaged 85 in the 1970-1974 period. This was reduced to 69 in 1975, 64 in 1976, and 40 in 1977. However, oxidant violations substantially increased in 1978 to 96 days.

Figure 2-2 presents graphically the trend in maximum oxidant levels in the Bay Area from 1975 to 1978. As shown, the maximum oxidant levels in the Bay Area exhibit a trend similar to that shown in Figure 2-1. The

Table 2-1 **Federal and California Ambient Air Quality Standards**

POLLUTANTS	AVERAGING TIME	CALIFORNIA STANDARDS	NATIONAL[1] STANDARDS
Ozone (oxidants)	1 Hr.	0.10 ppm	0.12 ppm
Carbon Monoxide	12 Hr.	10 ppm	
	8 Hr.		9 ppm
	1 Hr.	40 ppm	35 ppm
Nitrogen Dioxide	Annual Average		0.05 ppm
	1 Hr.	0.25 ppm	
Sulfur Dioxide	Annual Average		0.03 ppm
	24 Hr.	0.05 ppm[2]	0.14 ppm
	1 Hr.	0.5 ppm	
Suspended Particulate Matter	Annual Geometric Mean	60 $\mu g/m^3$	75 $\mu g/m^3$
	24 Hr.	100 $\mu g/m^3$	260 $\mu g/m^3$
Lead	30 Day Average	1.5 $\mu g/m^3$	
Hydrogen Sulfide	1 Hr.	0.03 ppm	
Hydrocarbons (Corrected for Methane)	3 Hr. (6-9 a.m.)		160 $\mu g/m^3$
Ethylene	8 Hr.	0.1 ppm	
	1 Hr.	0.5 ppm	
Visibility Reducing Particles	1 Observation	In sufficient amount to reduce the prevailing visibility to less than 10 miles when the relative humidity is less than 70%.	

1
National standards, other than those based on annual averages or annual geometric means, are not to be exceeded more than once per year.

National primary standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health. Each State must attain the primary standards no later than 1982. In the case of photochemical oxidants and carbon monoxide, extensions to 1987 at the latest may be granted if certain conditions set forth by the Clean Air Act of 1977 are met.

2
With simultaneous violation of State 1-hour oxidant standard or State 24-hour suspended particulate matter standard.

Table 2-2 **Air Pollution in the Bay Area by Station and Contaminant: 1975**

For oxidant and for nitrogen dioxide, "max" is the highest hourly average value expressed in parts per hundred million. For carbon monoxide, "max" is highest 8-hour average value in parts per million. (The one-hour standard for CO was never exceeded during the year.) For sulfur dioxide, "max" is highest 24-hour average value expressed in parts per million. For total suspended particulates (TSP), "mean" is annual geometric mean in micrograms per cubic meter.

Stations	Ox		CO		NO_2		SO_2		TSP	
	Max.	*	Max.	*	Max.	*	Max.	+	Mean	+
San Francisco	5	0	12.9	3	23	0	.042	1.7	49	2.6
San Rafael	13	1	10.0	1	15	0	.018	0.0	30	0.0
Richmond	10	2	6.2	0	20	0	.040	0.8	35	4.2
Pittsburg	14	10	6.0	0	10	0	.025	0.0	44	6.0
Concord	15	5	8.4	0	16	0	.015	0.0	31	1.7
Walnut Creek	17	21	—	—	—	—	—	—	—	—
Oakland	10	2	10.9	4	19	0	—	—	—	—
San Leandro	15	14	—	—	—	—	—	—	—	—
Hayward	23	28	—	—	—	—	—	—	—	—
Fremont	20	23	7.5	0	25	1	.004	0.0	49	9.2
Livermore	17	28	7.0	0	17	0	.006	0.0	69	22.5
San Jose	19	48	15.9	18	24	0	.009	0.0	58	13.8
Alum Rock	23	49	—	—	—	—	—	—	—	—
Gilroy	14	21	6.5	0	14	0	.003	0.0	51	7.6
Los Gatos	15	34	—	—	—	—	—	—	—	—
Sunnyvale	22	14	10.6	9	24	0	.010	0.0	39	0.0
Mountain View	21	17	—	—	—	—	—	—	—	—
Redwood City	13	14	10.1	2	24	0	.014	0.0	42	1.7
Burlingame	9	1	8.4	0	11	0	.054	1.7	33	0.0
Petaluma	11	1	—	—	—	—	—	—	—	—
Santa Rosa	10	3	9.4	1	18	0	.003	0.0	44	0.8
Sonoma	17	20	—	—	—	—	—	—	—	—
Napa	17	25	7.4	0	10	0	.017	0.0	54	2.5
Vallejo	16	10	12.6	12	11	0	.016	0.0	51	5.4
Fairfield	11	15	—	—	—	—	—	—	—	—
Crockett	—	—	—	—	—	—	.041	0.9	—	—
Martinez	—	—	—	—	—	—	.018	0.0	—	—

* Number of days ambient air quality standard was exceeded. (Federal oxidant standard >8 pphm.)
+Percent of observed days when State air quality standard was exceeded.

Source: Bay Area Air Quality Management District

Table 2-3 Air Pollution in the Bay Area by Station and Contaminant: 1976

For oxidant and for nitrogen dioxide, "max" is the highest hourly average value expressed in parts per hundred million. For carbon monoxide, "max" is highest 8-hour average value in parts per million. (The one-hour standard for CO was never exceeded during the year.)

For sulfur dioxide, "max" is highest 24-hour average value expressed in parts per million. For total suspended particulates (TSP), "mean" is annual geometric mean in micrograms per cubic meter.

Stations	OXIDANT Max	*	M**	CO Max.	*	NO_2 Max.	*	SO_2 Max.	†	Suspended Particulates Mean	‡
San Francisco	13	2	3	11.0	4	25	1	.053	1.8	55	9.3
San Rafael	12	5	8	15.5	7	13	0	.015	0.0	36	6.4
Richmond	13	7	9	6.8	0	23	0	.013	0.0	48	12.0
Pittsburg	15	29	22	5.5	0	19	0	.015	0.0	61	16.0
Concord	17	24	—	7.4	0	23	0	.030	0.0	51	12.8
Walnut Creek	14	10	28	—	—	—	—	—	—	—	—
Oakland	15	6	7	10.5	7	—	—	—	—	—	—
San Leandro	16	9	23	—	—	—	—	—	—	—	—
Hayward	18	30	—	—	—	—	—	—	—	—	—
Fremont	16	21	39	9.8	1	28	2	.011	0.0	62	18.1
Livermore	17	29	60	7.1	0	18	0	.005	0.0	85	41.3
Alum Rock	16	31	—	—	—	—	—	—	—	—	—
San Jose	17	32	40	20.2	61	28	3	.015	0.0	71	20.8
Gilroy	21	30	—	6.8	0	23	0	.011	0.0	62	11.7
Los Gatos	14	19	32	—	—	—	—	—	—	—	—
Sunnyvale	15	22	—	12.8	14	30	4	.008	0.0	50	8.6
Mountain View	14	11	12	—	—	—	—	—	—	—	—
Redwood City	17	16	15	10.2	10	21	0	.007	0.0	59	13.0
Burlingame	15	3	10	9.5	1	22	0	.018	0.0	49	7.0
Petaluma	9	5	6	—	—	—	—	—	—	—	—
Santa Rosa	9	1	—	9.5	1	15	0	.004	0.0	66	8.6
Sonoma	13	21	—	—	—	—	—	—	—	—	—
Napa	12	16	16	10.8	2	11	0	.009	0.0	65	11.8
Vallejo	18	21	16	18.0	40	14	0	.014	0.0	52	10.2
Fairfield	14	17	16	—	—	—	—	—	—	—	—
Crockett	—	—	—	—	—	—	—	.026	0.0	—	—
Martinez	—	—	—	—	—	—	—	.020	0.0	—	—

*Number of days ambient air quality standard was exceeded. (Federal oxidant standard $>$.8 pphm.)

M** For comparison, average number of days oxidant was exceeded in 1970-1974 mean.

† Percent of observed days when State air quality standard was exceeded.

‡ Percent of observed days when State air quality standard (100 $\mu g/m3$ for 24 hours) was exceeded.

Source: Bay Area Air Quality Management District

Table 2-4 Air Pollution in the Bay Area by Station and Contaminant: 1977

For oxidant and for nitrogen dioxide, "max" is the highest hourly average value expressed in parts per hundred million. For carbon monoxide, "max" is highest 8-hour average value in parts per million. (The one-hour standard for CO was never exceeded during the year.) For sulfur dioxide, "max" is highest 24-hour average value expressed in parts per million. For total suspended particulates (TSP), "mean" is annual geometric mean in micrograms per cubic meter.

Stations	OXIDANT			CO		NO_2		SO_2		TSP		
	Max.	*	M**	Max.	*	Max.	*	Max.	+	Mean	+	++
San Francisco	5	0	*3*	8.9	0	21	0	.035	0.0	41	1.8	0.0
San Rafael	10	2	*8*	7.9	0	14	0	.013	0.0	34	0.0	0.0
Richmond	8	0	*9*	5.2	0	16	0	.005	0.0	51	3.4	0.0
Pittsburg	12	6	*22*	5.5	0	14	0	.019	0.0	54	5.1	0.0
Concord	17	13	—	8.1	0	12	0	.018	0.0	49	6.9	0.0
Walnut Creek	13	6	*28*	—	—	—	—	—	—	—	—	—
Oakland	7	0	*7*	7.0	0	15	0	—	—	—	—	—
San Leandro	10	3	*23*	—	—	—	—	—	—	—	—	—
Hayward	12	5	—	—	—	—	—	—	—	—	—	—
Fremont	9	2	*39*	8.1	0	18	0	.003	0.0	60	11.9	0.0
Livermore	14	17	*60*	5.9	0	17	0	.003	0.0	68	19.0	1.7
Alum Rock	12	15	—	—	—	—	—	—	—	—	—	—
San Jose	14	13	*40*	14.4	32	21	0	.006	0.0	64	10.5	0.0
Gilroy	12	11	—	7.2	0	21	0	.007	0.0	62	10.2	0.0
Los Gatos	14	23	*32*	—	—	—	—	—	—	—	—	—
Sunnyvale	15	11	—	10.6	1	26	1	.007	0.0	45	1.7	0.0
Mountain View	14	8	*12*	—	—	—	—	—	—	—	—	—
Redwood City	14	3	*15*	8.1	0	15	0	.005	0.0	52	1.9	0.0
Burlingame	7	0	*10*	7.8	0	16	0	.007	0.0	34	1.8	0.0
Petaluma	8	0	*6*	—	—	—	—	—	—	—	—	—
Santa Rosa	7	0	—	8.2	0	12	0	.003	0.0	35	0.0	0.0
Sonoma	11	6	—	—	—	—	—	—	—	—	—	—
Napa	14	4	*16*	9.1	1	11	0	.011	0.0	53	0.0	0.0
Vallejo	13	4	*16*	14.2	13	14	0	.007	0.0	42	0.0	0.0
Fairfield	15	3	*16*	—	—	—	—	—	—	—	—	—
Crockett	—	—	—	—	—	—	—	.022	0.0	—	—	—

*Number of days ambient air quality standard was exceeded. (Federal oxidant standard >8 pphm.) M** For comparison, average number of days oxidant standard was exceeded in 1970-1974 mean. +Percent of observed days when State air quality standard was exceeded. ++Percent of observed days when Federal air quality standard (150 $\mu g/m^3$) was exceeded.

Source: Bay Area Air Quality Management District

Table 2-5 **Air Pollution in the Bay Area by Station and Contaminant: 1978**

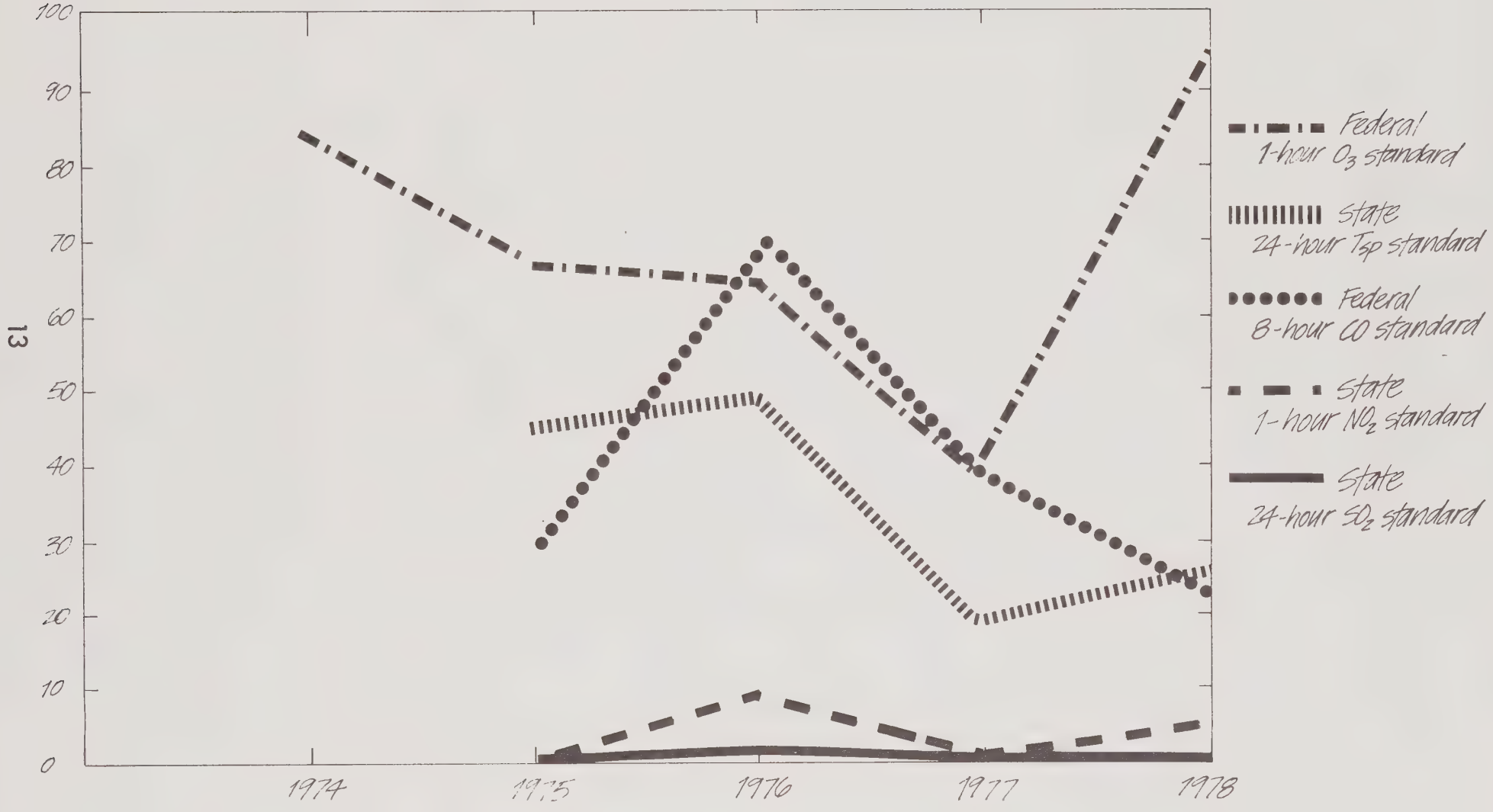
For ozone and for nitrogen dioxide, "max" is the highest hourly average value expressed in parts per hundred million. For carbon monoxide, "max" is highest 8-hour average value in parts per million. (The one-hour standard for CO was never exceeded during the year.) For sulfur dioxide, "max" is highest 24-hour average value expressed in parts per million. For total suspended particulates (TSP), "mean" is annual geometric mean in micrograms per cubic meter.

Stations	OZONE				CO		NO_2		SO_2		TSP		
	Max	*	**	A***	Max.	*	Max.	*	Max.	+	Mean	+	++
San Francisco	11	0	4	0.3	9.4	1	30	4	.024	0.0	42	1.8	0.0
San Rafael	16	2	13	0.7	9.1	1	11	0	.011	0.0	40	1.6	0.0
Richmond	14	1	11	0.7	5.1	0	13	0	.012	0.0	52	1.7	0.0
Pittsburg	17	6	34	4.0	5.1	0	15	0	.038	0.0	61	19.7	0.0
Concord	20	11	42	7.2	7.5	0	16	0	.011	0.0	45	8.5	0.0
Walnut Creek	17	5	31	3.3	—	—	—	—	—	—	—	—	—
Oakland	11	0	5	1.0	9.9	1	23	0	—	—	—	—	—
San Leandro	16	2	12	1.4	—	—	—	—	—	—	—	—	—
Hayward	17	5	17	4.4	—	—	—	—	—	—	—	—	—
Fremont	19	10	38	4.7	6.5	0	17	0	.004	0.0	60	16.4	1.6
Livermore	15	2	35	4.4	6.2	0	12	0	.004	0.0	64	15.2	1.7
Alum Rock	20	17	57	7.8	—	—	—	—	—	—	—	—	—
San Jose	18	12	53	7.4	18.5	23	22	0	.004	0.0	62	11.5	0.0
Gilroy	15	4	31	4.3	6.6	0	18	0	.004	0.0	57	13.1	0.0
Los Gatos	23	22	64	8.9	—	—	—	—	—	—	—	—	—
Saratoga	20	7	38	7.1	5.1	0	19	0	.010	0.0	—	—	—
Mountain View	15	1	16	1.0	—	—	—	—	—	—	—	—	—
Redwood City	12	0	6	1.0	9.5	2	17	0	.003	0.0	51	6.8	0.0
Burlingame	14	2	5	1.1	6.9	0	21	0	.028	0.0	39	3.8	1.9
Petaluma	10	0	1	0.0	—	—	—	—	—	—	—	—	—
Santa Rosa	10	0	3	0.0	7.4	0	11	0	.003	0.0	40	1.7	0.0
Sonoma	17	2	24	1.2	—	—	—	—	—	—	—	—	—
Napa	14	2	18	1.0	7.8	0	10	0	.013	0.0	52	4.9	0.0
Vallejo	16	2	13	2.7	10.1	1	16	0	.022	0.0	43	4.9	0.0
Fairfield	14	1	13	1.7	—	—	—	—	—	—	—	—	—
Crockett	—	—	—	—	—	—	—	—	.033	0.0	—	—	—

*Number of days ambient air quality standard was exceeded (Federal ozone standard >12 pphm). **Number of days old federal oxidant standard (>8 pphm) was exceeded. A*** Expected Annual Exceedances, defined as the average of excesses of the 12 pphm ozone standard for the past three years. +Percent of observed days when State air quality standard was exceeded. ++Percent of observed days when Federal air quality standard (150 μgm^3) was exceeded.

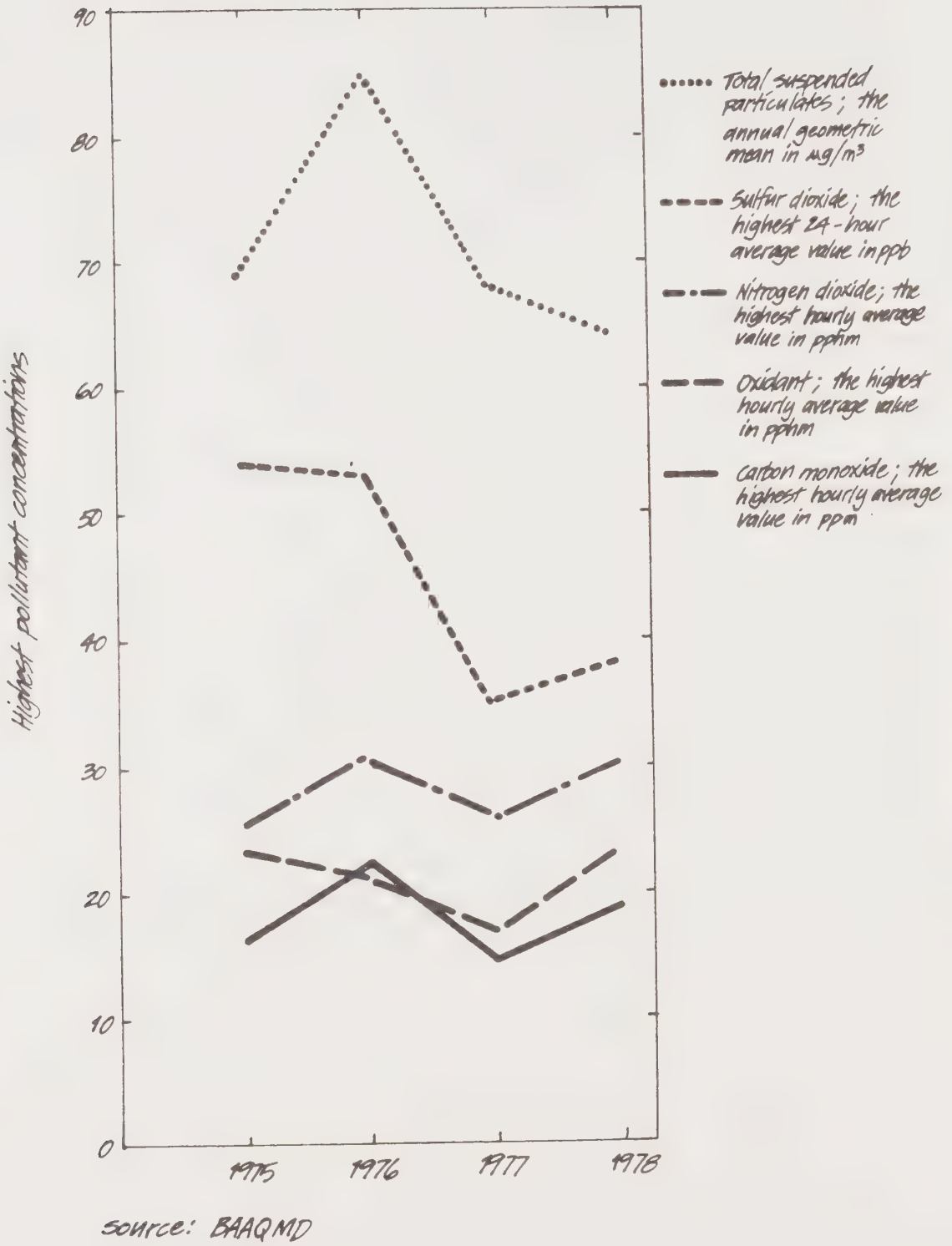
Source: Bay Area Air Quality Management District

Figure 2-1 **Number of Days Exceeding the Ambient Air Quality Standards in the Bay Area**



Source: BAAQMD

Figure 2-2 **Maximum Pollutant Levels in the San Francisco Bay Area, 1975 to 1978**



Source: BAAQMD

maximum oxidant levels gradually decreased from 0.23 ppm in 1975 to 0.17 ppm in 1977, but increased to 0.23 ppm in 1978.

In February 1979 the Environmental Protection Agency revised the Federal 1-hour standard from 0.08 ppm oxidants to 0.12 ppm ozone. (Ozone is the principal component of photochemical oxidants in most urban areas.) The Bay Area exceeded the new ozone standard in 1978 on 35 days, compared to 96 under the old oxidant standard.

Photochemical oxidants are formed in the atmosphere from hydrocarbons and nitrogen oxides reacting in the presence of sunlight. Ambient oxidant levels are influenced by a number of factors, including the quantity, composition, and spatial and temporal distribution of precursor emissions, meteorological conditions, and natural sources of ozone and its precursors. The long-term (from the late 1960s to 1977) downward trend at most Bay Area locations is caused primarily by the gradual reduction of total regionwide emissions of reactive hydrocarbons. This reduction is a result of the continued implementation of Federal and State motor vehicle emission control programs, and enforcement of the stationary source control regulations of the Bay Area Air Quality Management District.

Meteorological conditions also play an important role in determining ambient oxidant levels; they largely affect the physics and chemistry of ozone formation, transportation and dispersion. In general, ambient oxidant levels are higher at downwind locations than at upwind locations. During the 1975-1978 period, the areas of highest ozone

concentrations were generally in the arc from the Santa Clara Valley through Fremont to the Livermore Valley and the Diablo Valley (see Tables 2-2 to 2-5). Higher ozone concentrations in these areas are partially due to the direction of prevailing afternoon sea breezes, and more rapid growth in urban activity in these areas than in other parts of the region.

As noted previously, decreasing ozone trends in the Bay Area had continued from the late 1960s through 1977; however, there was a substantial increase in ozone concentrations at most Bay Area locations in 1978. As described in the Environmental Management Plan, hydrocarbon emissions are anticipated to be gradually reduced through 1985 as more control measures take effect over the 1975-1985 period. It was also indicated in the EMP that the oxidant levels in the Bay Area will be moderately reduced through 1985. Currently, BAAQMD and ABAG staff are investigating the causes for increased oxidant levels in 1978. At this time, an increase in natural hydrocarbon emissions due to heavy precipitation in the winter of 1977, unusual weather conditions and other factors are suspected causes for the rise in 1978 oxidant levels. More detailed evaluations of these conditions are planned in the continuing planning process.

Carbon Monoxide Concentrations

The maximum 8-hour carbon monoxide concentrations and the annual total number of days exceeding the Federal 8-hour standard of 9 ppm from 1975 to 1978 are plotted in Figures 2-1 and 2-2, respectively. The Federal 8-hour standard was exceeded on 24 days in 1978, compared to 41 days in

1977, 69 days in 1976, and 33 days in 1975. The major area of violations was the Santa Clara Valley, centered on San Jose and extending to Sunnyvale. As shown in Tables 2-2 to 2-5, the 8-hour carbon monoxide levels at San Jose were higher than any other monitoring sites in the Bay Area for all of the four years from 1975 to 1978. The maximum 8-hour carbon monoxide concentration at the San Jose monitoring site was 20.2 ppm in 1976, followed by 18.5 ppm in 1978 and 14.4 ppm in 1977. There are also secondary excesses of the 8-hour CO standard over Redwood City and Vallejo, and isolated urban-center cases at Oakland, San Francisco, and Napa. During the 1975-1978 period, the Federal 1-hour standard for carbon monoxide (i.e., 35 ppm) was not exceeded at any of the BAAQMD's continuous monitoring stations.

The primary sources of carbon monoxide emissions in the Bay Area are motor vehicles, accounting for more than 90% of total CO emissions. The carbon monoxide problem is usually localized, since ambient CO concentrations generally diminish as the distance from sources (i.e., major highways) increases. Ambient CO concentrations are also very sensitive to low-level radiation inversions, and tend to vary widely with season.

Almost all excesses of the Federal 8-hour standard are recorded between 4 p.m. and 2 a.m., in the months of November, December, January and February. The reason for this is winter-season formation of surface-based radiation inversions, which usually correspond in timing to the evening traffic maximums. Once initiated, a sustained buildup of high carbon monoxide levels occurs and remains undispersed for many

hours.

Total Suspended Particulates Concentrations

According to data collected by the BAAQMD at its continuous monitoring stations, the total suspended particulates (TSP) levels during the 1975-1978 period varied from year to year and from station to station. As shown in Figure 2-1, the State 24-hour TSP standard of 60 micrograms per cubic meter ($\mu g/m^3$) was exceeded on 46 days in 1975, 49 days in 1976, 20 days in 1977, and 25 days in 1978. The maximum annual geometric means (AGM) for TSP were 69 $\mu g/m^3$ in 1975, 85 $\mu g/m^3$ in 1976, 68 $\mu g/m^3$ in 1977, and 64 $\mu g/m^3$ in 1978. The Federal primary standard of 75 $\mu g/m^3$ was exceeded in 1976, but not in 1977 or 1978. All of these AGM values exceed the Federal secondary and State standard of 60 $\mu g/m^3$. The TSP levels show a general pattern of low values near the coast, increasing with distance inland, particularly into dry sheltered valleys. The TSP level measured at the Livermore station was higher than those at other monitoring sites for all of the four years from 1975 to 1978.

Major components of total suspended particulates are dust, organic matter and other matter, such as lead particles from auto exhaust. As projected in the Environmental Management Plan, emissions of TSP are anticipated to increase slowly from 1975 to 2000. Studies are planned to identify the nature and sources of TSP, and to evaluate the effect of the projected increase in emissions on continued compliance with Federal and State standards.

Nitrogen Dioxide Concentrations

Nitrogen dioxide is most important as a factor in the photochemical smog formation cycle; it is also a major contributor to the brown discoloration of the air.

The monitoring data indicate that the nitrogen dioxide levels in the Bay Area varied from year to year and from station to station during the 1975-1978 period. In 1975, the State 1-hour standard was exceeded only once, at the Fremont station. The days exceeding the State 1-hour standard increased to 8 in 1976, the most since 1970. The State 1-hour standard was exceeded only once at Sunnyvale by a narrow margin of 0.01 ppm in 1977. In 1978, the State 1-hour standard was exceeded 4 times at the downtown San Francisco station, but at no other station. The Federal NO_2 standard was never exceeded in the Bay Area during the 1975-1978 period.

Sulfur Dioxide Concentrations

During the 1975-1978 period, sulfur dioxide levels at most Bay Area locations were well below the Federal and State standards. There was only one violation of either standard in the 1975-1978 period; the State 24-hour standard of 0.05 ppm was exceeded at the downtown San Francisco station on December 2, 1976. It should be noted that the State 24-hour standard of 0.05 ppm is applicable only when the State 1-hour oxidant standard or State 24-hour total suspended particulate matter standard is also violated. The low sulfur dioxide concentrations in the Bay Area are a result of stringent control of major point sources by the BAAQMD. Increased use of higher sulfur fuels in the Bay Area are not expected to

result in violations of the Federal SO_2 standards. The potential for future violation of the State SO_2 standard is unknown at this time.

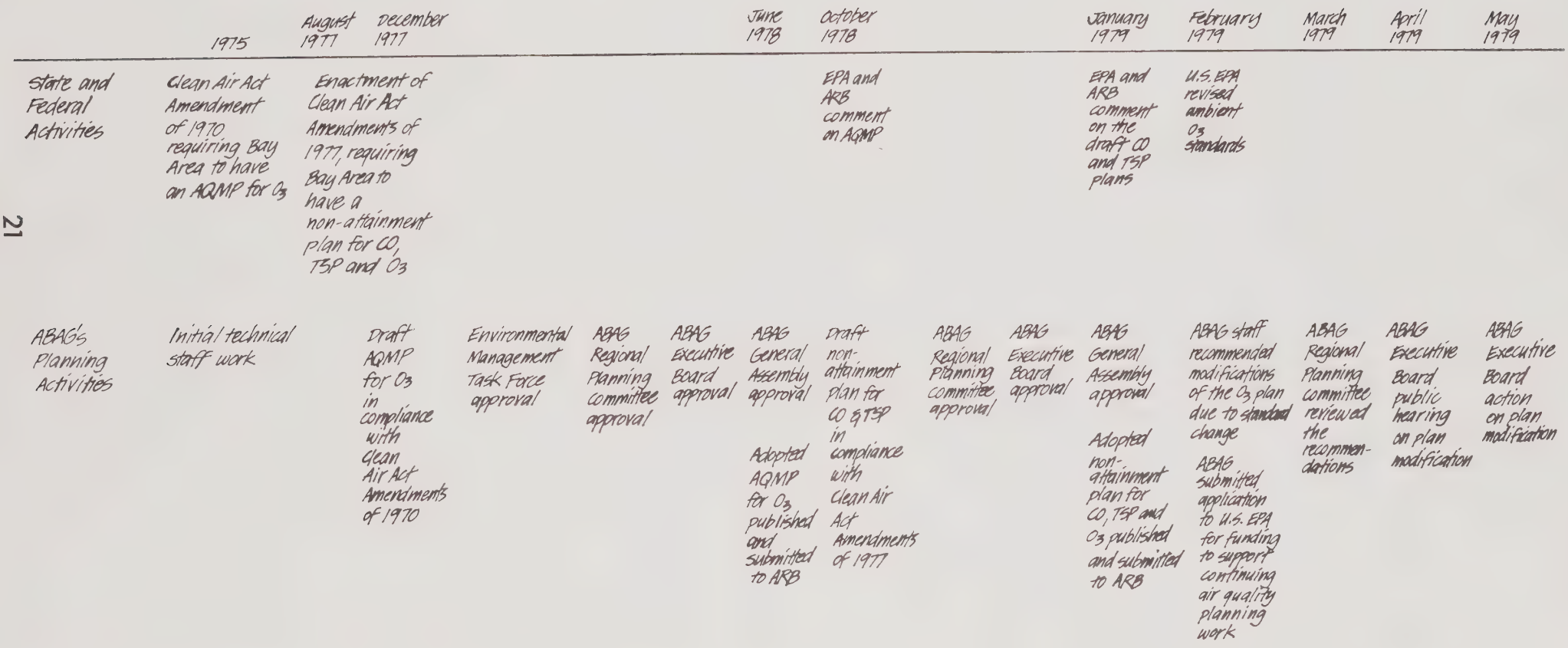
STATUS OF THE PLAN

Since the adoption of the regional Air Quality Maintenance Plan by the ABAG General Assembly in June 1978, a number of significant air quality planning activities have taken place. This section summarizes the major air quality planning activities from 1975 to early 1979.

Development of the 1979 Bay Area Air Quality Plan

The region's initial air quality plan, i.e., the Air Quality Maintenance Plan, was locally adopted in June 1978 as part of the Environmental Management Plan. That plan was designed to reduce hydrocarbon emissions, provide for attainment of the federal oxidant standard by 1985-87, and maintain the standard thereafter. The Air Quality Maintenance Plan was required by the Federal Clean Air Act Amendments of 1970. Since then, ABAG and other participating agencies have prepared the 1979 Bay Area Air Quality Plan to satisfy the non-attainment plan requirements of the 1977 Clean Air Act Amendments. The major activities and events in the evolution of the 1979 plan are illustrated in Figure 2-3. The San Francisco Bay Area was designated as a region where three national ambient air quality standards--oxidant, carbon monoxide and total suspended particulates--were being exceeded. ABAG was designated by the California Air Resources Board to prepare the plan in cooperation with the Bay Area Air Quality Management District and the Metropolitan Transportation Commission. In January 1979, the ABAG General Assembly adopted the 1979 Bay Area Air Quality Plan.

Figure 2-3 **Major Bay Area Air Quality Planning Activities: 1975 to Present**



At that time it was generally agreed that the most difficult air quality standard to meet in the Bay region was the Federal 1-hour 0.08 ppm photochemical oxidant standard. Most of the discussions in the 1979 Bay Area Air Quality Plan concentrated on the oxidant problem in the region. It included an exhaustive examination of the nature of the problem, alternative control strategies, and a comprehensive set of specific recommendations that, if implemented on the schedule adopted by the General Assembly, were estimated to reduce hydrocarbon emissions sufficiently to meet the oxidant standard by 1985-87. Attainment by 1982 of the old 0.08 ppm standard was not possible in the Bay Area, and a five-year extension was requested.

In the case of carbon monoxide, the plan described the nature of CO problems in the Bay Area and outlined the technical difficulties in preparing a regional plan for a pollutant where levels vary widely throughout the region. The 1979 plan showed how several actions to control hydrocarbon emissions adopted by the ABAG General Assembly in June 1978 would also provide reasonable further progress in meeting the CO standard. However, a more extensive technical analysis of CO problems was determined to be necessary to demonstrate that attainment of the CO standard will be achieved at all locations. The plan outlined a program for development of a more technically defensible and publicly acceptable plan over the next two years to meet CO standards in the locations where the localized violations occur. Extensive involvement of local agencies is expected to produce more substantial progress at attaining the CO standard throughout the region.

In the case of total suspended particulates, the plan described the recent history of violations of various Federal and State particulate standards, documented key factors behind the excessive particulate levels experienced in recent years, and described how those factors have changed. Most recent monitoring data of the BAAQMD show the Federal primary standard is now being attained and the plan called for redesignation of the Bay Area (specifically Alameda County) as an attainment area for the Federal primary TSP standard. The plan also outlined a program for attaining other Federal and State particulate standards as part of the continuing air quality planning process.

Actions of the plan to reduce hydrocarbon emissions included:

- Use available control technology on existing hydrocarbon sources.
- Continue the review of new and modified industrial facilities (new source review), using offsets and other provisions of the Clean Air Act Amendments of 1977. Use technology to produce lowest achievable emission rate on new and expanded hydrocarbon sources.
- Implement more stringent vehicle exhaust emission standards.
- Implement Statewide vehicle inspection and maintenance program.*
- Require exhaust control devices on existing heavy duty gasoline vehicles Statewide.*
- Preferential parking for carpools and vanpools.*
- Provide additional transit service through threefold transit improvement strategy.*
- Support development of high occupancy vehicle lanes and/or ramp metering on selected freeway segments when justified on an individual project basis.*

- Provide more ride sharing services such as jitneys and vanpools.*
- Develop more extensive and safe bicycle systems and storage facilities.*
- Adopt additional measures to ensure maintenance of the oxidant standard beyond 1985-87.

Actions with asterisks also reduce carbon monoxide emissions. Also included in the plan was an extensive program for the continuing air quality planning process in the Bay Area.

Modifications to the 1979 Bay Area Air Quality Plan

After its adoption by ABAG's General Assembly, the 1979 Bay Area Air Quality Plan was submitted to the California Air Resources Board for review. On January 24, 1979, the Executive Officer of the California Air Resources Board informed ABAG that "deficiencies" still exist in the 1979 (oxidant) plan which make approval by the EPA unlikely." The Executive Officer asked that a meeting of the participating agencies be held to discuss corrective actions.

In February 1979, the EPA Administrator revised the photochemical oxidant standard. The revision relaxed the standard in two ways. First, the numerical standard was changed from 0.08 ppm to .12 ppm. Second, the new standard calls for measuring ozone--one of many photochemical oxidants. The change in the ozone standard to 0.12 ppm means that the amount of hydrocarbon emissions that may be allowed in the region is greater than that allowed in the 1979 Bay Area Air Quality Plan adopted in January 1979. Based on a review of previously prepared analyses and supporting data, the allowable emissions level

corresponding to attainment of the new standard was estimated. This information is summarized in Table 2-6, which indicates that additional emissions of approximately 122 tons per day may be allowed in the plan.

Table 2-6 **Impact of the New Ozone Standard on Allowable Hydrocarbon Emissions in the Bay Area**

	Old Standard (0.08 ppm)	New Standard (0.12 ppm)
Percent hydrocarbon emission reduction required to meet the standard in 1985	43%	27%
Allowable hydrocarbon emissions (tons/day)	< 450	< 572

Source: Bay Area Air Quality Management District

Meetings of representatives of ABAG, BAAQMD and ARB were subsequently held to resolve ARB concerns regarding the plan. A compromise was achieved as summarized below:

1. ARB accepted the Bay Area analysis that the impact of the recent standard change is approximately 122 tons/day. Less hydrocarbon emission reductions are needed to demonstrate attainment and maintenance of the revised ozone standard. That is, instead of approximately 450 tons/day being allowed, about 572 tons/day can be allowed and still meet the 0.12 ppm standard.

2. The additional 122 tons/day hydrocarbon emissions would be distributed as follows:

   (a) Approximately 22 tons/day are taken up by more recent EPA mobile source emission factors (needed if EPA is to approve the plan).

(b) Approximately 18 tons/day are taken up by a 3 percent uncertainty factor to be built into the baseline emission projections.

(c) Approximately 32 tons/day are taken by a lower emission reduction estimate for the then soon-to-be adopted NSR rule by the BAAQMD.

(d) Approximately 25 tons/day are taken by deleting the heavy duty gasoline retrofit measure from the plan.

(e) Approximately 25 tons/day are to be set aside as a regional growth allowance or growth increment as permitted by § 172(b)(5) of the Clean Air Act.

ABAG staff recommended this compromise to ABAG's Regional Planning Committee on March 14, 1979. Subsequently, the RPC voted to submit the recommendations to ABAG's Executive Board for action. On April 19, 1979, the Executive Board asked the RPC to consider the compromise again and allow additional public comments. The Executive Board approved the recommended plan modifications in May 1979.

Approval Status

After approval by the ABAG Executive Board, the modified 1979 air quality plan was submitted to California Air Resources Board. The Air Resources Board has reviewed and accepted the plan, and incorporated it into the State Implementation Plan. It is currently being reviewed by EPA.

Implementation Status

- Stationary Source Emission Controls

The adopted stationary source controls consist of two major programs: Requiring the use of "Available Control Technology" for existing

sources; and continuation of New Source Review for new and modified sources. The Bay Area's program to require use of "available control technology" parallels the Environmental Protection Agency's nationwide program to require "Reasonably Available Control Technology" in all non-attainment areas needing an extension beyond 1982 to meet Federal quality standards. Tables 2-7A and 2-7B, printed from the 1979 Bay Area Air Quality Plan, indicates those source categories for which appropriate regulations have been adopted to date. These control programs are embodied in the existing Bay Area Air Quality Management District Regulations 2 and 3, and the following new regulations:

Regulation	Source Category	Date Adopted
13	Terminals and Bulk Plants	1/24/79
14	Metal Container and Closure and Coil Coating	1/24/79
16	Paper and Fabric Coating	1/17/79
17	Motor Vehicle Assembly Plants	1/24/79
18	Refinery Equipment	1/17/79
19	Appliance and Metal Furniture Coating	3/7/79
20	Cutback Asphalts	3/21/79
21	Solvent Metal Cleaning Operations	3/7/79

When fully implemented, these control programs are expected to provide about half of the total reduction in hydrocarbon emissions estimated for the use of available control technology. The remaining emission reductions are expected from a number of further regulations that are scheduled for adoption in the 1980-1982 period, as shown in Table 2-7B.

Table 2-7A **Comparison of EPA RACT Measures and BAAQMD Regulations**

	EPA RACT MEASURE	CONTROL REQUIRED	BAAQMD REGULATORY CONTROL	COMMENT
1.	Service Station Phase I (Tank)	90%	90% (Reg 2)	No new regulation needed.
2.	Fixed Roof Tanks	Internal Floating Roof	Secondary Seals (Reg 3)	District more restrictive. No new regulation needed.
* 3.	Gasoline Bulk Plants (Truck filling)	95% Vapor Balance	60% (Reg 3) Proposed Reg 13	District less restrictive. New regulations needed.
* 4.	Gasoline Bulk Terminals	95%	95% Proposed Reg 13	Need to modify Reg. to include smaller terminals and consider spills and leaks.
* 5.	Metal Degreasing	85% Control Overall	85% if > 40 lb/day 0% if <40 lb/day (Reg 3)	District less restrictive. New regulation needed.
6.	Cut Back Asphalt	No Organics Allowed	Allows 400 lb/ton (Reg 3)	District less restrictive. New regulation needed.
* 7.	Auto Body Painting	70%	20% (Reg 3) Proposed Reg 17	District less restrictive. New regulation needed.
* 8.	Can Coating Fabric Coating Paper Coating Coil Coating	50-80%	20-40% (Reg 3) Proposed Reg 14 and 16	District less restrictive. New regulation needed.
* 9.	Metal Coating	80%	20-50% (Reg 3) Proposed Reg 14	District less restrictive. New regulation needed.
*10.	Large Appliance Manufacture	80%	20-50% (Reg 3)	District less restrictive. New regulation needed.
11.	Magnet Wire Insulation	80%	Less than 80% (Reg 3)	District less restrictive (No operations in District)
12.	Refinery: a) Vacuum systems b) Waste water systems c) Process unit turn arounds	Best Modern Practices	Best Modern Practices Proposed Reg 18	District about the same. Regulations need clarification.

* Denotes ARB Model Rules adopted or in preparation.

Table 2-7B **Comparison of EPA RACT Measures with Available Control Technology By Source Category in 1985**

EPA RACT MEASURES	BAAQMD SOURCE CATEGORIES (#)	REDUCTION ESTIMATES TONS/DAY (T/D)		ESTIMATED REGULATION DEVELOPMENT SCHEDULE	
		EPA	BAY AREA PLAN	ADOPTED	IMPLEMENTED
1. Service Stations Phase I	#26, 27, 28 Vehicle Fill & Tanks	27.0*	0*	1972	1975
2. Fixed Roof Tanks	#23 Storage & Blending	14.9	14.9	1977	1978
3. Gasoline Bulk Plants	#25 Bulk Plants	6.8	6.8	1979	1980
4. Gasoline Bulk Terminals					
5. Metal Degreasing	#35 Degreasers	35.0	35.0	1979	1981
6. Cut Back Asphalt	Not in BAAQMD Inventory	20.5**	0**	1980	1983
7. Auto Body Painting				1979	1983-5
8. Can & Coil Coating Fabric & Paper Coating	#31 & #32 Industrial Coating-- Solvent and Water Base	38.3	38.3	1979	1981-2
9. Metal Coating					
10. Large Appliance Mfg.					
11. Magnet Wire Insul.					
12. Refinery	***#2 is Valve Leaks @ 7.4 T/D;				
a) Vacuum System	Vac. Sym.@ 2.5 T/D; A.P.I. @ 3 T/D				
b) Wastewater	Load Racks @ 3 T/D; Misc. 1 T/D;	19.5	19.5	1979	1982
c) Process Unit Turnaround	#3 U/B & Flares @ 2.6 T/D				
Subtotal	--	162.0	114.5	--	--
ACTION 1 SOURCE CATEGORIES NOT COVERED BY CURRENT EPA RACT					
A. Other Chemical	#9	0	2.6	1982	1983
B. Other Ind/Com	#10 Pulp/Paper; #19 Food/Agri.	0	4.1	1982	1983
C. Marine Loading	#24	0	4.6	1980	1982
D. Solvent & Other Tanks	#29 & #30	0	7.7	1981	1982
E. Coml/Dom Coatings	#33 & #34	0	21.7	1980	1982-3
F. Dry Cleaners	#36 & #37	0	13.0	1980	1982
G. Rubber Fabrication	#38	0	4.7	1981	1983
H. Plastic Fabrication	#39	0	23.0	1982	1984
I. Printing	#40	0	9.0	1980	1982
J. Other Organic Evap.	#41	0	20.0	1981	1983
Subtotal Source Categories Not Covered By Current EPA RACT		0	110.4	--	--
TOTAL EPA RACT AND ACTION 1 ACT		162 - 27= 135	224.9		

* Service Station Phase I Control was completed in the Bay Area prior to EPA guidance. It was not included in Action 1 emission reduction estimates.

** Cut back asphalt was not included in emission inventory and no credit was taken in Action 1. The emission reduction will occur when a new district regulation is implemented.

*** A.P.I. separators; U/B - upset/breakdown

This latter set of regulations is primarily aimed at reducing emissions from various sources of organic solvent evaporation.

The existing New Source Review Rule was adopted for the Bay Area by the California Air Resources Board in December 1977. Permits granted by the BAAQMD in 1978 indicate that a net reduction of 7 tons/day of hydrocarbon emissions were achieved through the use of offsets. Three of those seven tons are "banked," meaning that some applicants reduced emissions beyond what was required with the provision that they have the right to emit that amount from future modifications. The BAAQMD has adopted a revised form of the New Source Review Rule, which is now pending approval by the California Air Resources Board before it will be put into effect. This latest revision includes a number of significant features:

- Emission offset ratios to be required are more specifically defined in terms of their radius of applicability and the method of emissions estimation used;

- Under certain circumstances, emission reductions of organic compounds may be used to offset emission increases of NOx;

- Provisions regarding "emissions banking" are made more specific, and use of "banked" emissions may be suspended if such use would interfere with the overall goal of making reasonable further progress toward attainment of air quality standards;

- Special provision is made for treatment of power plants to coordinate the New Source Review process with the California Energy Commission's NOI process;

- Special exemptions from offset requirements are provided for resource recovery projects and other similar projects with energy conservation benefits;

- A more specific definition of Best Available Control Technology (BACT) has been included;

- Substantial reliance is placed on air quality modeling to determine the impact of projects and proposed emission offsets on ambient air quality;

- The provisions of the rule apply for State ambient air quality standards as well as Federal standards.

The banking provisions in this latest version of the New Source Review rule apply only to those emissions that are "banked" by individual sources subject to BAAQMD permit regulations (again, banked emissions in this context are emissions that are reduced by a source beyond the legal requirements of BAAQMD regulations). In addition to these emissions, the 1979 Bay Area Air Quality Plan included a 25 ton/day hydrocarbon emissions growth allowance for the region. At the present time, these emissions cannot be allocated to sources until 1982. If at that time

reasonable further progress toward attainment of the ozone standard has been demonstrated, then the emissions growth allowance could be "deposited" in the bank for use. Considerable uncertainty exists regarding whether such withholding of the growth allowance is an appropriate interpretation of Federal regulations.

- Mobile Source Emission Controls

The mobile source emission control programs adopted in the 1979 Bay Area Air Quality Plan were:

- Motor vehicle inspection and maintenance program
- Retrofit program for heavy-duty gasoline trucks
- More stringent emission standards for new vehicles beginning in 1990.

The feasibility of adopting more stringent emission standards for new vehicles beginning in 1990 is being considered by the Air Resources Board. Since adoption is not necessary for several years, no immediate implementation actions by the State are expected.

As stated previously, deletion of the retrofit program for heavy duty gasoline trucks was adopted as part of the modifications to the 1979 Bay Area Air Quality Plan.

With respect to the motor vehicle inspection and maintenance program, bills authorizing such a program were introduced in the State Legislature. None passed by June 30, 1979--the legal deadline for the State to do so. It is conceivable the Legislature will not act to

authorize inspection/maintenance during the 1979 portion of the 1979-1980 legislative session. EPA can be expected to disapprove (or conditionally approve) SIP revisions for failure of the Legislature to approve the program. Also in jeopardy is the extension to December 31, 1987 in the deadline for meeting the ozone and carbon monoxide standards. It is not known how the Legislature will respond to EPA proposed action on the SIP revisions, or the consequences on the Bay Area of any failure of the Legislature to respond appropriately to any proposed actions.

- Transportation Controls

Five transportation controls were adopted by the Metropolitan Transportation Commission as part of the 1979 Bay Area Air Quality Plan. These controls were amended into MTC's Regional Transportation Plan in September 1978. Moreover, the inclusion of these controls in the Regional Transportation Improvement Program (TIP) demonstrates the commitment to implementation. The TIP is a 5-year program of funding for transportation projects within the Bay Area.

The first of these measures is a preferential parking program for carpools and vanpools, currently being implemented. Caltrans operates a number of fringe parking lots for carpool and transit users. Caltrans also has a demonstration program providing carpool parking (approximately 500 spaces) in downtown San Francisco at $10 per month for each space. Currently this program is in the evaluation phase. Other jurisdictions are also providing preferential carpool parking.

The second transportation measure is a transit improvement strategy, also in the implementation stage. A wide range of transit improvements are programmed in the current TIP. On the basis of these improvements, each of the transit operators has adopted a ridership target for 1982. The sum of these targets will be sufficient to achieve a 1.3 ton per day reduction of hydrocarbon emissions claimed for this measure. MTC also continually seeks additional funding for transit improvements not yet programmed in the TIP.

The third transportation measure calls for the provision of high-occupancy vehicle (HOV) lanes and/or ramp metering. The current TIP recommends improvements in virtually all of the congestion locations identified in the "Program for Preferential Treatment for High-Occupancy Vehicles in the San Francisco Bay Area" (Caltrans District 4, July, 1975). Further study is required on a number of the Interstate Highway projects. For example, the need for HOV facilities on Route 580 between Castro Valley and the Bay Bridge is currently under study by MTC and Caltrans. Recommendations are under review. A Caltrans study of preferential treatment on I-80, between the Carquinez and Bay Bridges, is to begin in 1979 and is expected to be completed within two years.

The fourth measure deals with ride-sharing services. A non-profit corporation was set up in late 1977 to expand the ride-sharing services which have been provided by Caltrans. This agency is funded by the State Energy Commission, Caltrans District 4, and MTC. Two programs are currently under way. One is a carpool-matching program targeted to specific employers. The second is a vanpooling program where the agency

leases vans to the participants. Funding for this organization and for other similar efforts in Santa Clara County is included in this year's TIP. The Golden Gate Bridge District is also involved in a number of carpool-matching efforts. One carpool-matching efforts, recently funded by MTC, is the Casual Carpool Program for commuters in Marin and Sonoma Counties.

The final measure calls for provision of facilities to encourage bicycling, particularly for commute or other trips normally made by auto. Although some bicycle facilities are shown in this year's TIP, more planning is needed by many agencies. Local planning and implementation of bicycle systems will be the responsibility of individual cities, counties, transit operators and others. MTC will develop a framework for the overall system, and then coordinate the development of the local elements into a regional bicycle plan. It is anticipated that planning will be completed by January 1980, and implementation commitments secured by July 1980.

Comparison of the 1979 Bay Area Plan with Other Non-Attainment Area Plans

During the preparation of the 1979 Bay Area Air Quality Plan, the Bay Area Plan was compared with other non-attainment area plans. It was intended to examine the consistency of the control strategies proposed by various metropolitan areas across the county. Table 2-8 lists 44 urban areas that will probably need an extension to meet the ozone standard by 1987. The design value--the maximum observed ozone value used for planning control strategy requirements--ranges from .16 in Worcester, Massachusetts, to .39 in Los Angeles. Five areas facing

Table 2-8 **Tentative Urban Areas Needing an Extension to 1987 to Attain the Ozone Standard[a]**

Population Rank		Design Value p.p.m.	% Reduction	Model
2	Los Angeles/South Coast CA (San Bernardino)[b]	.39		EKMA[c]
1	New York, NY	.323	66-77	Several
-	New Jersey		55-77	Several
13	Houston, TX	.27	60	Rollback (RB)
10	St. Louis, MO	.248	60	EKMA
3	Chicago, IL (Aurora-Elgin)[b]	.241	53	EKMA
62	Allentown, PA	.24	50	Rollback
85	Ventura-Oxnard, CA	.24	50	Rollback
16	Milwaukee, WI	.238		-
-	Connecticut (Statewide)	.235	67	EKMA
30	Providence, RI	.233	66	EKMA
5	Detroit, MI	.23		Rollback
9	Cleveland, OH	.23	50-67	EKMA & RB
11	Pittsburgh, PA	.23	49	Rollback
4	Philadelphia, PA	.22	49	Rollback
19	San Diego, CA	.22		EKMA
21	Cincinnati, OH	.22	45-50	EKMA & RB
60	Wilmington, DE	.22	49	Rollback
7	Boston, MA (Lawrence-Haverhill)[b]	.219	69	EKMA
38	Sacramento, CA	.21		Rollback
46	Springfield, MA	.209	66	EKMA
29	Indianapolis, IN	.20		
57	Youngstown, OH	.195	45-64	EKMA & RB
6	San Francisco, CA(San Jose)[b]	.19	27	LIRAQ[d]
14	Baltimore, MD	.19	37	Rollback
79	Fresno, CA	.19		Rollback
82	Baton Rouge, LA	.19	38	Rollback
104	Scranton, PA (Wilkes-Barre)[b]	.188	36	Rollback
34	Dayton, OH	.185	40-61	EKMA & RB
8	District of Columbia	.18	33	Rollback
33	Louisville, KY	.18	38	Rollback
55	Richmond, VA	.18	33	Rollback
49	Toledo, OH	.175	36-58	EKMA & RB
53	Nashville, TN	.175	36	Rollback
24	Denver, CO	.17		SAI[e]
26	New Orleans, LA	.17	27	Rollback
36	Norfolk, VA	.17	29	Rollback
51	Salt Lake City, UT	.17	30	Rollback
83	Worcester, MA	.16	43	EKMA

[a]Information from EPA Status Report, March 1, 1979

[b]Urbanized areas in parentheses were included with larger area. Thus, while only 39 are listed, actual total is 44.

[c]Empirical Kinetic Modeling Approach

[d]Livermore Regional Air Quality Model.

[e]Systems Applications Inc., Urban Air Shed Model.

severe air pollution problems were selected for comparison with the Bay Area. These five non-attainment areas are the Houston, Denver, St. Louis, Washington, D.C., and New York metropolitan areas. The specific control strategies proposed by each of the five non-attainment areas as well as the Bay Area are indicated in Table 2-9. Since all of the non-attainment area plans compared have not been finalized and are yet to be approved by the Environmental Protection Agency, the information shown in Table 2-9 is tentative and represents the current status of these plans. It should be noted that the types of controls proposed in a non-attainment area are dependent on a number of factors including the severity of pollution problem, significance of various emission sources, efficiency of existing control systems, and other technical and political issues. It is also difficult to compare the plans at this stage because the details of enforcement have not yet been worked out.

PROJECTED AIR QUALITY TRENDS

As required by the 1977 Clean Air Act, the 1979 Bay Area Air Quality Plan provides for "reasonable further progress" toward attainment of the Federal ozone and carbon monoxide standards. The projected emission trends for hydrocarbon and carbon monoxide under the 1979 air quality plan are shown in Figures 2-4 and 2-5, respectively. The effects of modified air quality plan (due to change in the ozone standard and the compromise reached between ARB and the Bay Area) on the projected emissions trends are also shown in the respective figures. As modified, the 1979 Bay Area Air Quality Plan will, if implemented on the schedule adopted by the General Assembly, provide more than the minimum reasonable further progress required under the 1977 Clean Air Act.

Table 2-9 **Preliminary Comparison of Control Strategies Proposed in the 1979 Bay Area Air Quality Plan and Other Non-Attainment Areas' Plans ***

Control Measures	Non-Attainment Areas						
STATIONARY SOURCE	Houston	Denver	St. Louis		Washington	New York City	S. F. Bay Area
			Illinois	Missouri			
1. Service Station Stage I (Tank)	X		X		X Stage 2 Vapor Recovery Recommended	X	X
2. Fixed Roof Tanks (Internal Floating Roof Secondary seals)	X		X			X	X
3. Gasoline Bulk Plants	X		X			X	X
4. Gasoline Bulk Terminals	X		X			X	X
5. Metal Degreasing	X				X		X
6. Cut Back Asphalt	X		X		X		X
7. Auto Body Painting	X		X				X
8. Can Coating	X		X			X	X
Fabric Coating	X		X			X	X
Paper Coating	X		X			X	X
Coil Coating	X		X			X	X
9. Metal Coating	X		X			X	X
10. Large Appliance Manufacture	X		X			X	X
11. Magnet Wire Insulation			X			X	X
12. Refinery:							
a) Vacuum systems	X		X				X
b) Waste Water Systems	X		X				X
c) Process unit turn arounds	X		X				X
OTHER STATIONARY SOURCE MEASURES							
1. Cold Solvent Cleaning	X		X				
2. Chemical Plant Manufacturing-Process Unit Turnarounds	X						
3. Action 1 Source Categories (Bay Area Plan)							X
TRANSPORTATION							
1. Inspection Maintenance	X	X	Being Studied	Being Studied	X	X	X
2. Fuel Transfer & Storage Operations Vapor Control	X				X	X	X
3. Improved Public Transit	X	X	Being Studied	Being Studied	X	X	X

* This represents the status of these non-attainment plans as of March 1979. ABAG staff consulted appropriate EPA, State and local agencies in preparing the table.

Table 2-9 **(continued)**

Control Measures	Non-Attainment Areas						
TRANSPORTATION Con't.	Houston	Denver	St. Louis		Washington	New York City	S. F. Bay Area
4. Exclusive Bus/Carpool Lanes & Programs	X	X	Being Studied	Being Studied	X (Exclusive lanes being studied) (Carpool programs)	Being Studied	X
5. Reserved Bus/Carpool Lanes (Certain Times and Places)	X				Being Studied	X	X
6. Long-Range Transit Improvements	X	X			X	X	X
7. Controlled On-Street Parking	X				X	Being Studied	
8. Park and Ride Lots	X	X			X	Being Studied	X
9. Reserved Nonmotorized Pedestrian Lanes	X				X	Being Studied	
10. Employer Participation Carpool, Mass Transit, Bicycling Programs	X	X	Being Studied	Being Studied	X	Being Studied	X
11. Bike Lane Programs and Storage Facilities.	X	X	Being Studied	Being Studied	X	Being Studied X (Manhattan)	X
12. Staggered Work Hours	X	X	Being Studied	Being Studied	Being Studied	Being Studied in other Areas	
13. Road User Charges					Being Studied	Being Studied	
14. Controlled Vehicle Idling	X		Being Studied	Being Studied	X	-	
15. Traffic Flow Improvements	X	X	Being Studied	Being Studied	X	Being Studied	
16. Fleet Vehicle Conversion or Operations Control	Being Studied	X			Being Studied	-	- X (Operations Control)
17. Medium And Heavy Duty Retrofit Programs	Being Studied				Being Studied	Being Studied	X
18. Cold Start Vehicle Emissions Reduction Programs	-				Being Studied	-	

Table 2-9 **(continued)**

Control Measures	Non-Attainment Areas						
OTHER TRANSPORTATION CONTROL MEASURES	Houston	Denver	St. Louis		Washington	New York City	S. F. Bay Area
			Illinois	Missouri			
19. Preferential Parking					X		X
20. Residential Permit Parking					X		
21. Improved Rail Transit					X	X	
22. Vanpooling		X	Being Studied	Being Studied	X		X
23. Auto Free Zones					Being Studied		
24. Increased Parking Fees					Being Studied		
25. Increased Fuel Taxes					Being Studied		
26. Maintaining Current Transit Fare Levels						X	
27. Light Duty Retrofit Programs		X					
28. Tax Incentives to Encourage the purchase of very low Polluting Motor Vehicles (less than 50%)		X					
29. Federal or State mandated reapplication of high altitude modifications on automobiles		X					
30. More Stringent EOA high altitude emission standards		X					
31. Adoption of local ordinances prohibiting the operation of gasoline powered motor vehicles which produce visible emissions.		X					
32. Public Education Program to support the successful implementation of transportation control measures.		X					
33. Study of Emissions characteristics and effects of Diesel-Powered vehicles.		X					
34. Proposed Program of Automobile use restrictions ("No Drive Day")		X					

Figure 2-4 **Estimated Reasonable Further Progress toward Achieving the 0.12 ppm Ozone Standard in the San Francisco Bay Area**

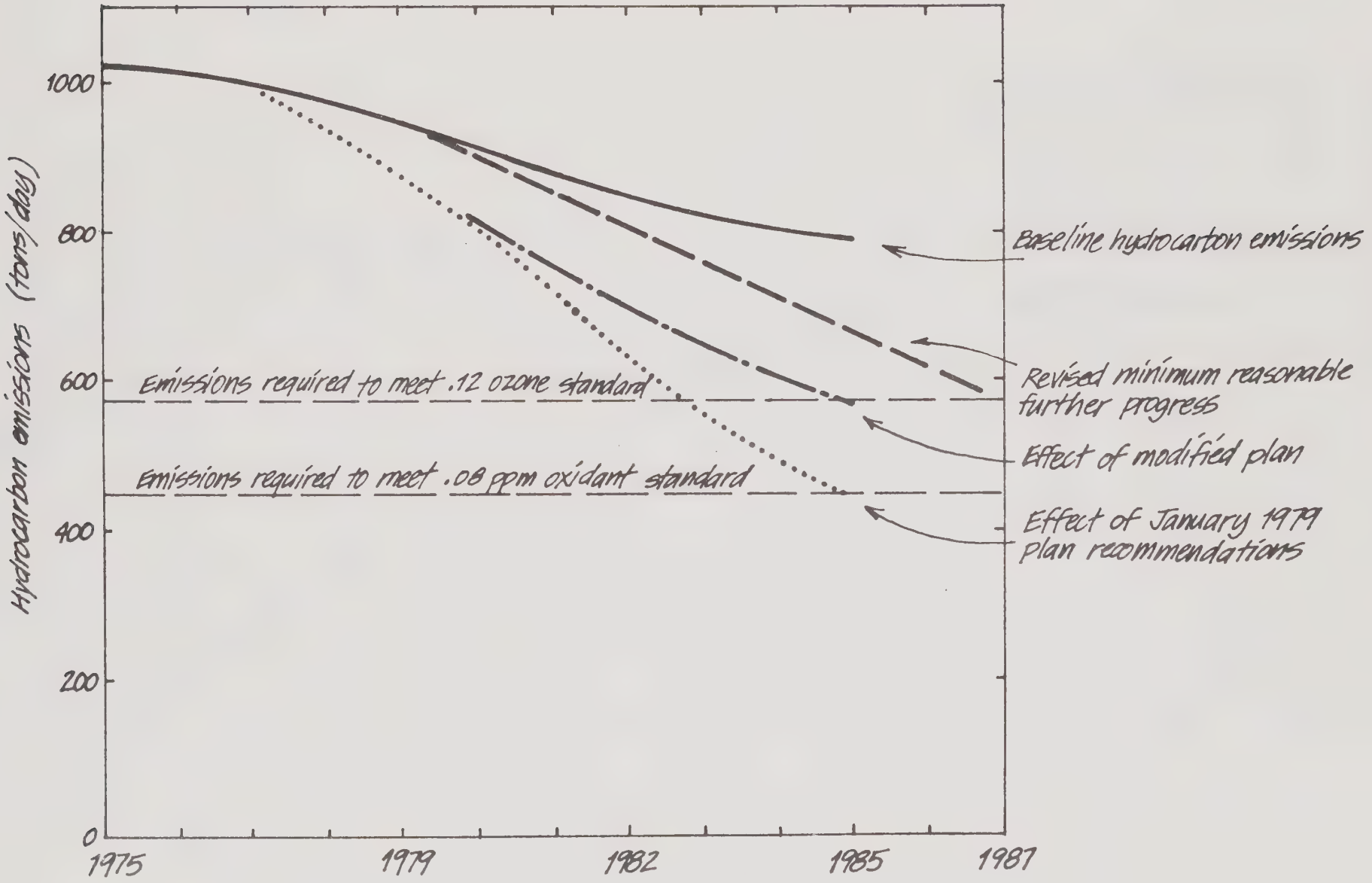
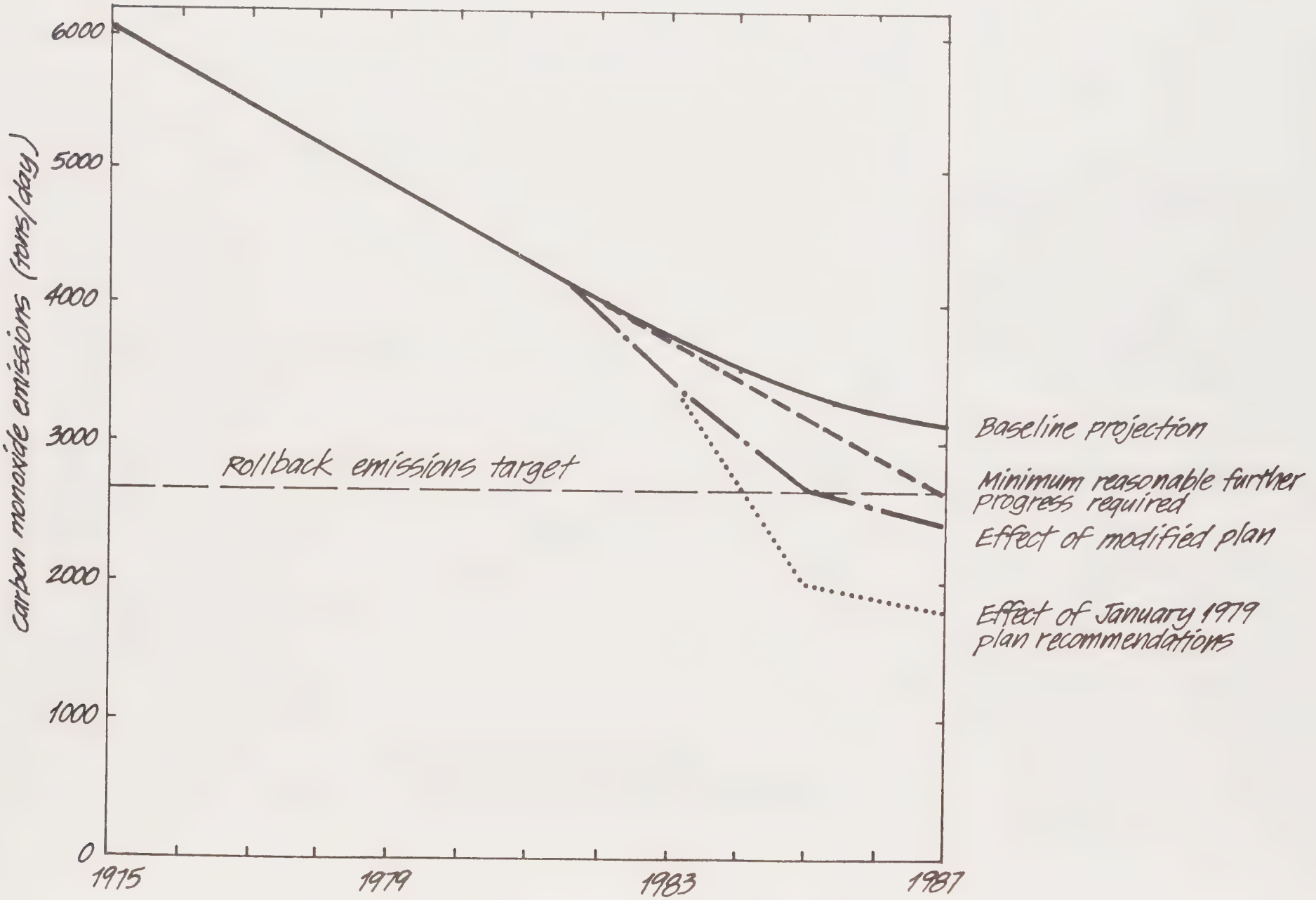


Figure 2-5 **Estimated Reasonable Further Progress toward Attainment of the Federal Carbon Monoxide Standards (Based on Linear Rollback and Implementation of All Recommended Control Programs)**



FUTURE WORK

In February 1979, ABAG, as the designated lead agency for preparation of the Non-Attainment Plan in the San Francisco Bay Area, submitted an application for planning funds authorized under § 175 of the 1977 Clean Air Act. The application was revised and re-submitted in May 1979. It is currently being reviewed by EPA and the Urban Mass Transportation Administration. The application proposes work to be completed to fulfill the requirements of § 172 of the 1977 Clean Air Act.

In essence, the proposed work is a continuation of the on-going air quality planning program in the Bay Area. During the past three years, the cooperative, multi-agency planning effort has led to the locally adopted 1979 Bay Area Air Quality Plan. This plan demonstrates the region's commitment to the requirements of the 1977 Clean Air Act. While much was accomplished, much also remains to be completed before the goals and objectives of the Act are met. Foremost among the work to be completed are:

- Securing management agreements and commitments to implement programs adopted in the 1979 plan

- Monitoring the overall effectiveness of the region's control efforts and ensuring reasonable further progress is being made toward attainment of ambient ozone and carbon monoxide standards

- Developing a fair and equitable process for allocation of the emissions growth allowance identified in the plan

- Performing a more rigorous and detailed evaluation of carbon monoxide problems in the Bay Area and developing additional control measures as necessary

- Evaluating the effect of new data (e.g., emission factor revisions unaccounted for emission sources) on the adopted plan and developing plan revisions as necessary.

The proposed work program covers 2-1/2 years of effort spanning the next three fiscal years. The major objective is to achieve strong but publicly acceptable and implementable air pollution control programs in the Bay Area that satisfy all requirements of the Clean Air Act. The resulting 1982 Bay Area Air Quality Plan will be submitted to ARB for inclusion in the 1982 State Implementation plan.

SOLID WASTE MANAGEMENT

CURRENT CONDITIONS

Generation of Solid Wastes

In 1975, the total quantity of solid waste (municipal waste, wastewater solids, and hazardous wastes) generated in the Bay Area was about 11.5 million tons. Of this amount, about 4.2 million was agricultural waste (crop wastes and animal manures) that was generally returned to the soil. The remainder included 6.1 million tons of municipal wastes, 0.8 million tons of hazardous wastes and 450,000 tons of wastewater solids. Most of these wastes were disposed of in landfills, and there has been a considerable amount of cross-county disposal. If the wastes had an average density of 500 pounds per cubic yard and were placed on a football field, a 15-yard layer would be created every day. At the end of the year, the field would be more than 3 miles high. The same amount of waste would also fill more than 27 skyscrapers the size of the Bank of America building in San Francisco--one every 13 days.

Table 2-10 summarizes the estimated solid waste quantities generated in the Bay Area in 1975, 1980 and 1990.

Current Disposal and Management Practices

In general, cities, counties and special districts have authority for collection, processing, transportation, and disposal of waste within

Table 2-10 **Summary of Estimated Solid Waste Quantities Generated in Each County in 1975, 1980 and 1990 (in 1000 tons/year)**

COUNTY	YEAR	MUNICIPAL WASTES[a]								HAZARDOUS WASTES[b]	WASTEWATER SOLIDS/SEWAGE SLUDGE[c]	AGRICULTURAL WASTES[a]	TOTAL[d]
		RESIDENTIAL	COMMERCIAL	INDUSTRIAL (NON-MANUFACTURING)[e]	UNCOLLECTED	CONSTRUCTION/DEMOLITION	LITTER/STREET SWEEPINGS	FOOD PROCESSING	SUBTOTAL				
Alameda	1975	490	377	216	f	g	g	78	1161	109	88	125	1483
	1980	530	423	238	f	g	g	g	1269	140	166	g	1703
	1990	660	497	289	f	g	g	g	1524	226	175	g	2050
Contra Costa	1975	203	146	78	39	104	2.6	i	610	413	38	222	1283
	1980	230	160	81	42	113	2.8	g	667	529	191	217	1604
	1990	286	187	95	48	127	3.6	g	785	857	242	208	2092
Marin	1975	98	98	9	f	17	5.5	h	228	1	12	601	842
	1980	117	117	10	f	19	7.0	h	270	1	13	601	885
	1990	158	158	11	f	24	9.0	h	360	2	14	601	977
Napa	1975	25	25	f	f	4	h	8	62	0	2	2	66
	1980	26	27	f	f	6	h	8	65	0	28	2	96
	1990	29	29	f	f	7	h	8	73	0	34	2	109
San Francisco	1975	270	208	f	f	650	27	g	1155	17	53	2	1227
	1980	290	227	f	f	650	32	g	1199	22	124	2	1347
	1990	323	265	f	f	650	33	g	1271	36	132	2	1441
San Mateo	1975	270	279	95	f	136	43	5	828	35	56	44	963
	1980	297	308	100	f	150	46	5	906	44	68	44	1062
	1990	360	372	110	f	182	50	5	1079	72	73	44	1268
Santa Clara	1975	562	218	232	114	312	30	158	1626	76	168	198	2068
	1980	650	251	294	125	343	g	g	1851	97	265	163	2376
	1990	856	327	366	149	405	g	g	2291	157	292	150	2890
Solano	1975	87	72	15	f	13	21	16	224	158	8	775	1165
	1980	103	81	19	f	16	25	198	442	203	74	814	1533
	1990	161	141	21	f	27	41	223	614	328	93	862	1898
Sonoma	1975	90	91	f	f	20	6.8	h	204	11	24	2231	2474
	1980	107	107	f	f	23	8	h	245	14	55	g	2545
	1990	120	119	f	f	27	9	h	275	22	55	g	2583
TOTAL[d]	1975	2100	1500	650	150	1300	150	250	6100	820	450	4200	11500
	1980	2400	1700	740	170	1300	180	420	6900	1050	983	4200	13000
	1990	3000	2100	890	200	1400	250	640	8500	1700	1109	4200	15500

[a]Quantities estimated by the State Solid Waste Management Board based on County Solid Waste Management Plans, in the Bay Area Solid Waste Management Project - Phase I Report, February, 1977.

[b]Rough quantities estimated by ABAG. It was estimated that about half of these wastes generated would be disposed of at hazardous waste disposal sites (Class I sites). Tonnages shown are mostly in liquid form; residues requiring land burial after evaporation are a very small proportion of the liquid waste.

[c]Quantities estimated by the San Francisco Bay Region Wastewater Solids Study (assuming 80% moisture content).

[d]Totals have been estimated and rounded.

[e]Non-manufacturing industrial wastes produced from activities not directly associated with production, such as office and shipping materials.

[f]Quantities included in Residential, Commercial or Non-Manufacturing Industrial Categories.

[g]Quantities not reported or estimated.

[h]Quantities negligible.

[i]Two million gallons per day.

their jurisdictions. In addition, State law (Senate Bill 5) requires each county to prepare a county solid waste management plan. The county plan should provide for the management of all waste generated and disposed of within the county and include detailed implementation program to 1980 and other programs to 2000, and intergovernmental arrangements for implementation, enforcement, and continuing planning.

All the Bay Area county plans were adopted by the counties and cities and were approved by the State Solid Waste Management Board (SSWMB). State guidelines require a status report every three years from the date of county plan approval by the SSWMB. County plans must be amended to resolve inconsistencies with State policy identified in these status reports.

The following description of the current solid waste management system in the Bay Area is abstracted from the nine county plans.

- Storage and Collection

Many cities and counties have local ordinances regulating the storage of municipal wastes. However, the ordinances in general do not include all the minimum standards for storage adopted by the SSWMB in December 1974.

Most residential wastes are collected by private franchise collectors. Franchises are issued by cities and counties, but sometimes by special districts. Only three cities in the Bay Area operate their own collection services (Berkeley, San Leandro and Dixon). In many cases, collection of residential wastes is required by local ordinances.

- Transfer, Processing and Resource Recovery Facilities

Municipal wastes are usually taken by the collection trucks directly to landfill sites for disposal. However, in some cases because of the long distance between collection points and the disposal sites, transfer facilities are needed to reduce transportation costs. At a transfer station, collected wastes are transferred to much larger long-haul trucks before wastes are transported to a disposal site. In 1975, five such transfer stations were operated in the Bay Area. The largest one is located in San Francisco. It was also the only transfer station that includes mechanical waste processing such as shredding and recovery of metal cans.

Other resource recovery facilities include recycling centers in various communities. These centers recover more than 60,000 tons of recyclable materials such as ferrous metals, aluminum, tin, glass, cardboard and newsprint, each year. However, the amount of material currently being recycled is probably less than 5% of the municipal waste stream.

At present, no waste-to-energy facilities are in operation in the Bay Area. Although feasibility studies have been conducted by several local agencies, including the City and County of San Francisco and the Cities of Alameda and Berkeley, institutional arrangements, including assurance of waste supply and public/private ownership, and financing relationships remain to be worked out.

• Disposal

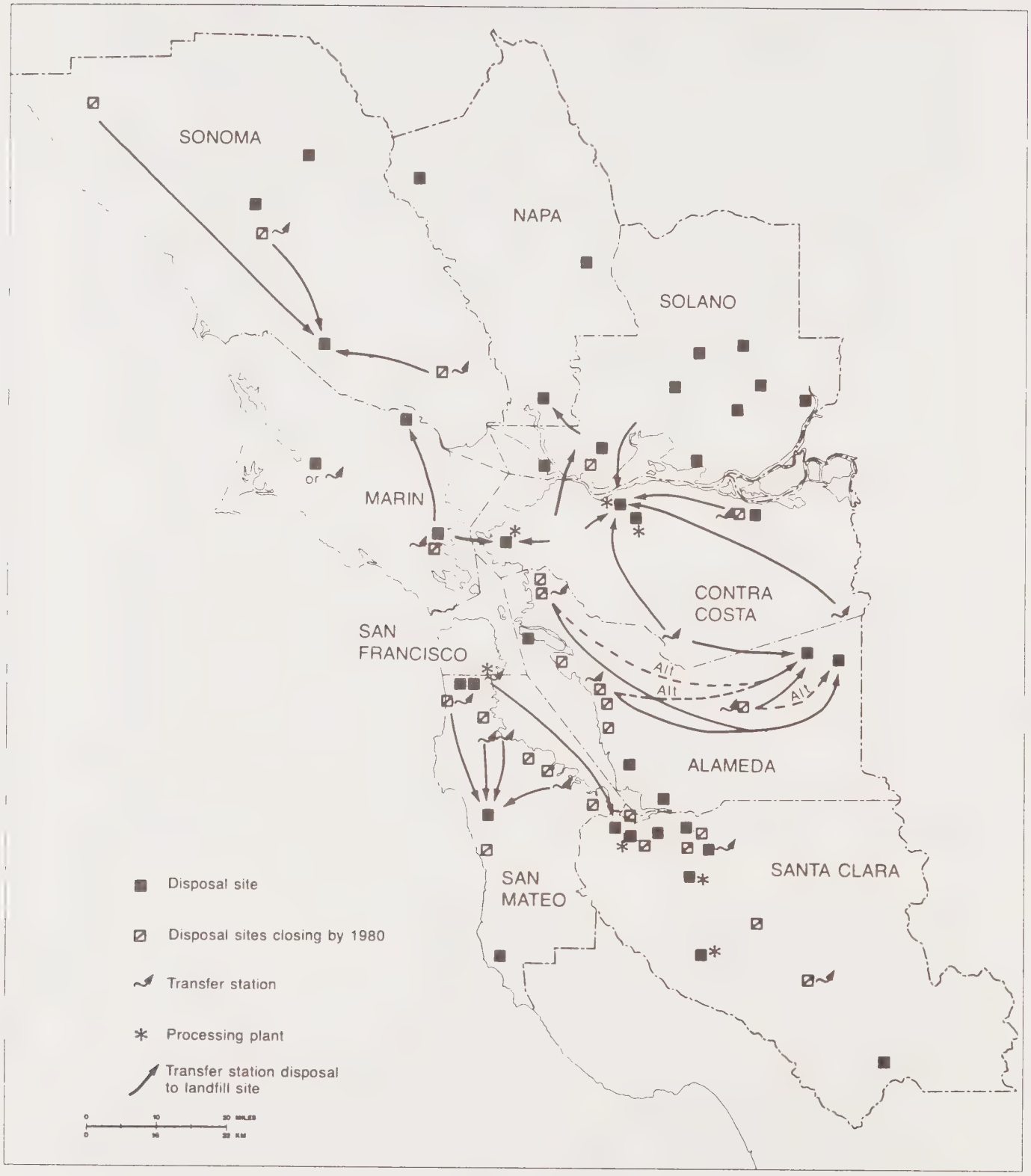
Most of the collected wastes were disposed of at the 60 active landfill sites in the Bay Area in 1975. Many of these sites (see Figure 2-6) will be closed by 1980. There is a considerable amount of cross-county disposal, as shown in the figure. In 1975, about 1.5 million tons of municipal wastes went to landfills outside the county of origin. All of San Francisco's refuse, and some from southern San Mateo County is landfilled in Santa Clara County. Southern Marin and Solano Counties transport wastes to Contra Costa County. Solano also exports wastes to Napa County. Two hazardous waste disposal sites in Contra Costa County and a small one in Solano receive industrial wastes from all nine Bay Area counties.

• Administration and Operation

In general, cities, counties, and special districts are responsible for solid waste management. The cities and counties have authority for collection, processing, and disposal of wastes within their jurisdictions. Collection rates of the franchise collectors are regulated by City Councils or County Boards of Supervisors.

Many city and county agencies are involved with various aspects of solid waste management. Typically, the City and County Health Departments inspect waste disposal activities and enforce waste handling standards. The County Planning Department or Public Works Department is responsible for countywide solid waste management planning and reviews permit applications for new solid waste facilities.

Figure 2-6 **Solid Waste Management System for the Bay Area (1975-1980)**



In addition, depending upon location and type of facility, permits for new or expanded solid waste facilities may be required from:

San Francisco Regional Water Quality Control Board

Bay Area Air Quality Management District

San Francisco Bay Conservation and Development Commission

California Coastal Zone Conservation Commission

State Lands Commission

U.S. Army Corps of Engineers

• Financing

Collection services provided by private companies are paid through user fees. Landfill revenues come from disposal fees charged to commercial haulers and private citizens. In general, collection accounts for 80 to 90% of system costs because it is so labor-intensive. Disposal operations account for 10% to 20% of total costs.

The numerous public agencies involved in solid waste management incur costs related to administration, planning, regulation, enforcement, and operation activities. These costs are spread among the involved agencies, and are partially financed through public funds and franchise fees.

STATUS OF THE PLAN

The regional solid waste management plan was adopted by the ABAG General Assembly in June 1978, as part of the Bay Area's Environmental Management Plan. The plan deals with municipal wastes, hazardous wastes

and wastewater solids. The regional plan builds on a composite of the solid waste management plans of the nine Bay Area counties. In general, the county programs involve coordination of the present practice of sanitary landfill. However, as existing sites reach capacity, local governments are increasingly looking to alternatives to landfills. New sites, located at considerable distances, will be more costly. And there is rising public awareness of the valuable and non-renewable resources that are lost in the present landfill disposal system. Accordingly, the emphasis of the regional plan is on resource conservation--areawide approaches to more effective programs for source reduction, recycling and resource recovery for all categories of wastes.

Approval Status

The locally adopted regional solid waste management plan was submitted to the State Solid Waste Management Board on September 28, 1978, and to the Department of Health Services (for approval of the hazardous waste section), on October 10, 1978, pursuant to the requirements of State law (Senate Bill 424). According to SB 424, the regional plan will become part of the State Solid Waste Management Plan under the federal Resource Conservation and Recovery Act of 1976 when it has been approved by the board. State plan preparation under RCRA has been delayed pending issuance of final guidelines from EPA. In a letter on June 19, 1979, the board estimated that approval of the ABAG plan would come within 18 months of its receipt of the RCRA guidelines. The board also recognized that the regional plan will have been updated to reflect recent developments affecting the State's solid waste program by the time it is scheduled for the board's review and approval.

Implementation Status

Implementation of the policies and actions contained in the plan's three components: Municipal Wastes, Hazardous Wastes and Wastewater Solids, is described below.

- Municipal Wastes

The first group of policies is concerned with improved management of municipal wastes. Implementing agencies include the Regional Water Quality Control Board, as well as ABAG and the nine counties.

Action by the Regional Water Quality Control Board -- The plan recommended regulation of disposal site operations to protect surface and ground water quality. The Regional Water Quality Control Board has nearly completed adoption of waste discharge requirements for all landfill sites in the region.

Actions by ABAG -- A number of policies recommended stepping up waste reduction, source separation and energy recovery efforts. ABAG's activities included:

- Completion of the manual, A Guide to Starting a Home Collection and Recycling Program, funded by the State Solid Waste Management Board and accepted in August 1978.

- Receipt of a grant of $136,900 from the State Solid Waste Management Board for the Bay Area Creative Recycle Project

(described later). Grant funds are from the Litter Control, Recycling and Resource Recovery Act of 1977.

- Completion of a study funded by the U.S. Department of Agriculture (Forest Service) to identify generators and users of urban wood wastes, inventory and estimate quantities and examine alternatives for reuse, conversion to energy, etc.

- Establishment of an in-house office and computer paper recycling program.

- Monitoring of Senate Bill 4 (Rains et al.), the Beverage Container Reuse and Recycling Act of 1979, the only bill pertaining to waste reduction, recycling or assuring markets for secondary materials introduced in either Congress or the State Legislature this year. Action is not expected before January 1980.

- Conducted A-95 reviews of applications for Federal assistance from RCRA for large-scale waste-to-energy projects, finding them consistent with regional policies:

  - Cities of Alameda, Berkeley, San Jose-Santa Clara, City and County of San Francisco, and Alameda County Solid Waste Management Authority.

- Completion of final draft of a report for the Solid Waste Management Board: Institutional Factors Related to Implementation of Energy Recovery Facilities in the San Francisco Bay Area.

Actions by Counties -- Proposition 13 cutbacks have reduced solid waste planning effort in most counties. While on-going refuse collection and disposal services, carried out under franchises with private operators, are not affected, many local governments have not had the resources to develop and carry out waste reduction and recycling objectives of county or regional plans.

Legislation passed in 1979 reduced by nearly half the anticipated Statewide revenues of $18 million for recycling and resource recovery grants to be provided under the Litter Control, Recycling and Resource Recovery Act of 1977.

Local activities include:

- Alameda County Solid Waste Management Authority (a joint powers agency of the county, the cities and wastewater districts) approved the Alameda County Medium - Long-Term Facilities Plan. The plan was reviewed by ABAG for consistency with the regional solid waste plan, and approved by the State Solid Waste Management Board. The narrative and tables in the regional solid waste

management plan will be revised to reflect this change.

- Recipients of RCRA grants for energy recovery projects were:

  - City and County of San Francisco
  - City of Berkeley

- Recipients of SB 650 (State) grants for energy recovery projects were:

  - City of Alameda - $176,622 for a 1,000 ton-per-day facility to produce refuse-derived fuel for generating power to feed into Alameda's municipally owned electric utility.

  - Central Contra Costa Sanitary District - $440,931 for a 1,200 ton-per-day facility for recovering ferrous metals and aluminum and producing refuse-derived fuel to be used in sludge reduction.

  - City and County of San Francisco - $367,020 for a 1,400 ton-per-year facility to produce steam for electrical generation.

- Recipients of SB 650 grants for recycling center projects (local governments, private and non-profit organizations):

- Alameda County Comprehensive Recycling - $23,025.
- Berkeley Ecology Center - $89,670
- City of El Cerrito - $92,000.
- Eco-Encore, Emeryville - $13,000.
- Garbage Reincarnated, Inc., Cotati - $48,815.
- City of Livermore - $29,000.
- Many Hands, Inc. Recycling Center, Contra Costa County - $64,513.
- Marin Recycling and Resources Recovery Association - $75,000.
- OCCUR, Oakland - $50,000
- City of Palo Alto Sanitation Co. - $151,910.
- People Who Care, Los Altos - $174,760.
- Redwood Empire Disposal Co., Santa Rosa - $192,220.

- Recipients of SB 650 grants for innovative projects included:

  - Conservatree Paper Company, San Francisco - $16,842 to plan a paper pulp mill that will use recycled paper.

  - Energy Resources Company, Los Altos - $111,268 to perform economic and environmental studies for a mobile agricultural waste pyrolizer funded by the State Solid Waste Management Board.

- Garretson-Elmendor-Zinov-Reibin, San Francisco - $50,000 to evaluate the technical and economic feasibility of producing electric power from forest wastes in the Lassen-Plumas National Forest.

- Golden Gate Disposal Company, San Francisco - $55,200 to design, construct and test a new paper separation machine.

- University of California, Berkeley and Davis - $25,000 to demonstrate large-scale methods for producing ethanol or yeast protein from rice straw.

- West County Agency of Contra Costa County - $69,000 to develop and implement a project to recover energy from garbage and sewage sludge.

• Hazardous Wastes

Major responsibility for implementing policies to improve hazardous waste management rests with the State Department of Health Services. Negotiations have been proceeding very slowly between the State Department of Health Services and Bay Area industrialized counties for industry-by-industry surveys of hazardous waste generation and handling practices.

EPA regulations for hazardous waste (covering Identification and

Listing, Standards Applicable to Generators, Standards Applicable to Transporters, Standards Applicable to Facilities, Permits for Treatment, Storage or Disposal, and Guidelines for Development of State Hazardous Waste Program) are undergoing public review. ABAG staff has been reviewing these regulations, attending hearings and submitting comments.

- Wastewater Solids

The final EMP solid waste policies cover planning and management for sewage sludge. The preliminary regional wastewater solids management plan, prepared by the East Bay Municipal Utility District (EBMUD) as lead agency for a joint powers group of major dischargers in the region, was incorporated (as policies 15 and 16) into the regional solid waste plan adopted by the General Assembly in June 1978. Draft facilities plans for San Francisco, San Jose, EBMUD and Central Contra Costa Sanitary District have been developed during the past year. The four jurisdictions have completed public review of both the regional plan and the four facilities plans. When all have been approved by the Wastewater Solids Study agencies, the EMP actions under policies 15 and 16 of the solid waste plan will be modified to reflect the final wastewater management plan recommendations.

PROJECTED TRENDS

Business as Usual for Municipal Waste Management

As a result of Proposition 13 cutbacks and limited alternative funding sources for local recycling and resources recovery programs, no change in existing municipal waste disposal practices, nor significant reduction in wastes going to landfills is likely in the next two or

three years.

Recycling

Recycling efforts will probably continue at about the same level for the next three to five years, unless Federal or State legislation promoting recylcing and establishment of dependable markets for recycled materials both is enacted. Proponents and opponents of "bottle bills" are closely watching events in Michigan, the first highly industrialized state to pass a returnable beverage container law. Information on the economic and environmental impacts of the law, in effect since January 1, 1979, should begin to become available this year, and is expected to influence what happens in California and other industrial states, and in Congress. No bills supporting market development are currently being considered in Sacramento or Washington.

Continuing Development of Waste-to Energy Projects

A number of jurisdictions in the Bay Area will continue feasibility studies for large-scale waste-to-energy systems. These studies are being carried out with State and Federal assistance. As more detailed studies are completed, uncertainties about system reliability and economics will be resolved, and arrangements for securing waste supplies and for financing and operating the projects will be established. The Bay Area Air Quality Management District recently adopted a new New Source Review regulation. It appears that projects using refuse-derived fuels for energy generation or resource recovery projects using municipal wastes can qualify for an exemption under the new regulation. The NSR rule is awaiting approval by the Air Resources Board.

Greater Emphasis on Hazardous Waste Management

The Federal emphasis in waste management planning and implementation has shifted dramatically toward critical hazardous waste management issues.

Federal governmental agencies, principally EPA and the Department of Transportation, have primary responsibility. In California, the Department of Health Services is the lead agency for hazardous waste management. Regional and local roles are limited; the counties in assisting the Department of Health Services in acquiring adequate data for hazardous waste management through industry-by-industry surveys; and ABAG in identifying potential Class I disposal sites for multijurisdictional use, and working with counties and the State to develop institutional arrangements and obtain public acceptance.

FUTURE WORK

In FY 1979-80, ABAG will continue implementation of the regional solid waste management plan through the following programs and activities:

Municipal Wastes

Two recycling and resource recovery programs that will be carried out:

- Bay Area Creative Recycle Project. In this program ABAG will administer SSWMB funds (from SB 650) on behalf of Bay Area Creative Recycle, a consortium of school districts local recreation departments and community organizations. BACR will establish four depots (north, east, west and south bay) for receiving selected industrial waste materials and dispersing

them to Bay Area schools and community organizations for educational uses. Additional operating funds for the depots will be sought locally. ABAG is pursuing other grant possibilities for central coordination and information circulation activities.

- Urban Wood Waste Reuse Alternatives Study. A continuation of the FY 1978-79 U.S. Forest Service funded project, the study will include analysis of economic, social and environmental costs and benefits of various wood waste reuse options. A conference featuring a variety of existing wood recycling operations in the Bay Area will be held to improve communication among wood waste generators and reusers.

Hazardous Wastes

One of the five major emphases of the § 208-funded work program will be to establish the capacity requirements for hazardous waste disposal over the next 20-year period. This effort will tie in with the Department of Health Services' Statewide program for improved hazardous wastes management.

Negotiations with EPA will continue toward funding a proposal to develop a model program for securing public acceptance for establishment of hazardous waste disposal sites.

Wastewater Solids

ABAG, as the designated 208 agency, will seek funding to maintain and

update the regional wastewater solids plan as part of the continuing planning process for the EMP, and to work with the counties and wastewater agencies in integrating the regional wastewater solids plan policies and facilities plans into county solid waste plans.

Overall Implementation

ABAG will continue its major functions to promote implementation of regional policies and actions by agencies with key responsibilities:

- Closer integration of air and water quality, energy and solid waste planning;

- Maintaining and updating the regional plan as the framework for all solid waste and resource recovery activities of regional significance in the Bay Area;

- Providing assistance to member governments in the form of data and analytical services, governmental coordination;

- Reviewing applications for State and Federal assistance and draft environmental documents for proposed projects for consistency with regional policies; and

- Monitoring, making recommendations and advocating legislative and administrative changes that promote regional and local solid waste and resource recovery objectives.

WATER QUALITY MANAGEMENT

CURRENT CONDITIONS

The Environmental Management Plan included a review of historical water quality trends in the Bay Area from the early 1960s to 1975. This section briefly describes known changes in the region's water quality conditions from 1975 to 1978.

Analyses of water quality samples collected from San Francisco and the Delta are routinely performed by a number of agencies. These include wastewater dischargers, universities, U.S. Bureau of Reclamation, U.S. Geological Survey, Department of Water Resources, Regional Water Quality Control Board, and others. Interpretation of this data, however, lags far behind the collection effort. It is difficult to provide declarative statements of Bay and Delta water quality in the absence of this data analysis and effects of specific values obtained from water quality analysis. No specific and complete correlation exists between pollutants and certain Bay-Delta phenomena such as algal blooms, fish kills, diseased mussels or declining Dungeness crab populations. It is expected that further research will provide answers to these concerns.

In the introduction to the draft 1980 State-EPA Agreement, the State Water Resources Control Board reported several problem areas. The Napa River has substantial problems with coliform contamination, acidity, high nutrient levels and low dissolved oxygen--thought to be contributed

by wastewater discharger and surface runoff. The San Joaquin and Sacramento Rivers were rated to be better than minimum fishable and swimmable quality in 1978. However, both rivers have recently had problems with depressed oxygen levels and the San Joaquin suffers from nutrients and salts draining from agricultural lands. Additionally, excessive mercury levels were found in predator fish in the Sacramento River, which, in the Delta, is also the scene of unexplained recurring striped bass die-offs.

Several freshwater lakes in the region have been identified as suffering from algal blooms, bacterial contamination, or excessive sedimentation. Some of the most notable are Lake Temescal, Lake Merritt, San Mateo Lagoon, Cull Canyon and Nicasio Reservoirs and Berkeley Aquatic Park. Most other lakes and reservoirs in the region suffer from the same problems with different degrees of severity. In 1979-80 specific pollution control plans will be developed for the first five lakes while the other lakes and reservoirs will benefit from continued planning in surface runoff control.

SOURCES AND QUANTITIES OF POLLUTANTS FROM 1975 TO 1978

Although a wide variety of sources contribute pollutants to the waters in the Bay Area, they can be placed into a few categories within two major groups: point sources and non-point sources. Primary examples of point sources include municipal and industrial wastewater treatment plant discharges, at single, easily identifiable locations. Non-point sources enter receiving waters at many locations and irregular intervals. Typical examples are surface (stormwater) runoff, vessel

wastes, aerial fallout, septic tanks and agricultural drainage.

Although most fresh water entering the Bay comes from the Sacramento and San Joaquin Rivers, the major sources of nutrients and organic pollutants are surface runoff and municipal and industrial wastewater treatment plants. These originate within the region. Conversely, approximately one-half of the heavy metal load to the Bay is from sources outside of the region, followed closely by surface runoff with point sources third. The following discussions elaborate on these major sources and upon lesser sources such as vessel wastes and septic tanks.

Major Point Source Pollutants

In 1975, the base year for calculations and projections, there were 55 municipal wastewater treatment plants discharging into the Bay or Delta and six discharging directly to the ocean. Of those discharging to the Bay/Delta, 38 provided secondary-level wastewater treatment and 16 provided only primary-level treatment. There was one advanced treatment facility. Two facilities discharged secondary effluent to the ocean while four discharged primary effluent to the ocean. In 1975 there were only seven treatment plants reclaiming water or discharging effluent to the land.

By the end of 1978, the trend toward plant consolidation and secondary treatment had gained momentum. There were 41 municipal facilities discharging secondary or advanced treatment level effluent to the Bay/Delta and four such facilities discharging to the ocean. Eleven treatment plants discharged primary-level effluent to the Bay/Delta

while two discharged to the ocean. Wastewater reclamation had gained ground, with more than 2.5 billion gallons per year reclaimed or discharged to the ground from 29 major projects.

Table 2-11 compares the municipal effluent pollutant loads to waters of the region in 1975 with those for the end of 1978. Although there has been a 2.4% increase in sewered population, the total pollutant load decreased in 1978. The most significant reductions, 22% in biochemical oxygen demanding substances (BODs) and 11% in suspended solids, were achieved as a result of treatment plant conversion from primary to secondary level treatment. Nutrient discharges were relatively unaffected during this time.

Two other reductions are noteworthy. Although the sewered population in the region has increased, wastewater flow is slightly below that of 1975. This is believed to be a residual effect of water use conservation practiced in response to the recent drought. This conservation effect is gradually diminishing, although long-range effects will be felt from permanently installed conservation devices. Wastewater flows will be higher in the future as a result of new domestic uses and increased population. For some districts wastewater flow has finally exceeded pre-drought levels. The other reduction to note is in heavy metals discharged, by weight, or expressed as the weight of chromium with equivalent chronic toxicity (see Reference 1). The source control programs applied by municipal dischargers to industries releasing wastes to the sewers are effectively decreasing the amount of heavy metals passed through the treatment plants. Since many

Table 2-11 **Comparison of 1975 and 1978 Municipal Wastewater Treatment Plant Discharges[a]**

Population and parameters	1975	1978
Sewered population (s.u. 1 to 50)	4,486,000	4,597,000
Average dry weather flow (ADWF), mgd.	535	525
Biochemical oxygen demand (BOD_5), ppd	404,000	315,000
Total suspended solids (TSS), ppd	247,000	220,000
Total nitrogen (TN), ppd	126,000	133,000
Ammonia nitrogen	82,000	82,000
Total phosphorus (TP), ppd	68,000	64,000
Total equivalent heavy metals, ppd		
gross chromium	2,670	less than 1,820
chronic toxicity equivalent	3,680	less than 2,180

[a]Based on dischargers' self-monitoring reports and facilities plans.

of the metals were reported in the self-monitoring reports as being at or less than detectable limits, the regional totals shown in Table 2-11 could be considered as an upper limit.

Another significant group of point-source dischargers consists of major industries with their own wastewater treatment and discharge facilities. The 1978 EMP included results of a survey of significant industrial dischargers in 1975 including refineries, paper manufacturing, food processors and chemical manufacturers. Any industry discharging over 0.2 million gallons daily (mgd) of cooling water flow or 0.1 mgd including process flow, and more than 30 pounds of any pollutants per day was considered as a significant source. Forty-two dischargers met these criteria. Table 2-12 compares flow and pollutant discharge totals for 1975 and 1978, obtained from Regional Water Quality Control Boards' records for these dischargers.

There has been a noticeable reduction in pollutant discharges from major industries. In 1975 industry discharged 30% as much BOD as municipal plants, 28% as much suspended solids, 4% as much nitrogen and ammonia, and less than 1% as much phosphorus. In comparison, in 1978, the respective percentages were: 6%, BOD; 24%, suspended solids; 2% nitrogen and ammonia; and less than 0.5% phosphorus. A large part of the reduction in discrete industrial pollutant discharges can be attributed to increased wastewater treatment. However, the closure of two major dischargers in the Antioch area did account for one-half of the industrial BOD reduction and one quarter of the suspended solids reduction.

Table 2-12 **Treated Industrial Waste Loadings in 1975 and 1978**

Parameter	1975	1978	% Change
Flows, million gallons/day			
Average Industrial Flow[a]	72.6	71.7	-1.2
Additions and Withdrawals[b]	-21.0	-21.0	0
Net Flow	51.6	50.7	-1.7
Pollutant Loadings, lbs/day			
Biochemical Oxygen Demand	119,000	18,400	-85
Total Suspended Solids	69,700	52,800	-24
Total Nitrogen	4,700	3,800	-18
Total Phosphorus	325	270	-17
Ammonia Nitrogen	3,400	2,800	-17

[a] Includes process flow discharging new water and once-through flow (mainly coolant) of water withdrawn from receiving water.
[b] Several entities add non-polluted water or remove water from the Bay.

Surface Runoff

Surface runoff from urban and developed areas provides a major share of the pollutant loading to the waters of the region. Mathematical modeling of the surface runoff in 1975 correlated site specific studies, water quality analyses and land use characteristics to obtain a regional assessment of surface runoff conditions. Table 2-13 provides summaries by county of the pollutant loadings. These summaries were obtained from generalized data and may be substantially different from measured values in a watershed during a particular storm. An accurate assessment of surface runoff pollutant loadings must rely on water quality analysis data which is not available for most watersheds in the region.

In 1975 surface runoff in the Bay Area was estimated to have discharged less biochemical oxygen demand, nitrogen and phosphorus than the total of municipal and industrial wastewater treatment plants in 1975. However, surface runoff discharged substantially more suspended solids and heavy metals. Additionally, although bacterial pollution could not be quantified, surface runoff has been documented to produce substantial bacterial contamination in receiving waters.

More recent data on surface runoff pollution has not been developed. Major changes in surface runoff quality will not have occurred since 1975. As recently adopted surface runoff control measures are implemented, we will be able to reevaluate the pollutant loading to the Bay and will present this information in subsequent reports.

Table 2-13 **Regional Assessment of Surface Runoff Pollutant Loading in 1975**

County	BOD_5	Suspended solids	Total nitrogen	Total phosphorus	Equivalent heavy metals[a]
	Average annual discharge, 1000 lb.				
Alameda	3,100	121,700	670	82	
Contra Costa	2,410	130,000	570	66	
Marin	2,330	174,200	580	62	
Napa	1,510	143,200	400	37	
Santa Clara	2,830	147,100	690	84	
San Francisco	6,340	11,800	350	47	
San Mateo	2,450	143,300	610	69	
Solano	680	68,400	180	20	
Sonoma	840	99,800	230	22	
Total	22,490	1,040,000	4,280	428	3,785[a]

[a] calculated from sampling program concentrations, expressed as chronic toxicity equivalent of chromium.

Delta Outflow Pollutant Loadings

Annual estimates of 5-day BOD, total organic and ammonia nitrogen, (technically known as Kjeldahl nitrogen), total phosphorus, and heavy metals entering the San Francisco Bay near Chipps Island are presented in Figure 2-7. These estimates are based on monthly flow and pollutant concentrations obtained from STORET (the computerized EPA management information system for water quality data) for the 1972-78 period. Figure 2-7 also shows the Delta outflow index, calculated by the DWR, which represents the net outflow of the Sacramento River, San Joaquin River, and other major tributary flows entering the Bay near Chipps Island.

An apparent decreasing trend in the pollutant loads corresponding to a similar trend in the Delta outflow for the 1974-1977 period can be observed, with the lowest loads in the dry year of 1977. However, loadings for 1978 are increased with an increase in flow for the year. Variability of loadings follows the variability of flows with high correlation. Therefore, the observed variation, more specifically the declining trend for the 1974-1977 period, appears due more to climatic variation rather than any apparent change in upstream point source control. Small sample size does not allow conclusive comparison of the annual pollutant loading patterns with other factors. However, it can be theorized that pollutants entering the Delta principally arise from surface runoff, agricultural drainage and resuspension of river bottom sediments rather than comparatively "steady" sources such as municipal waste discharges.

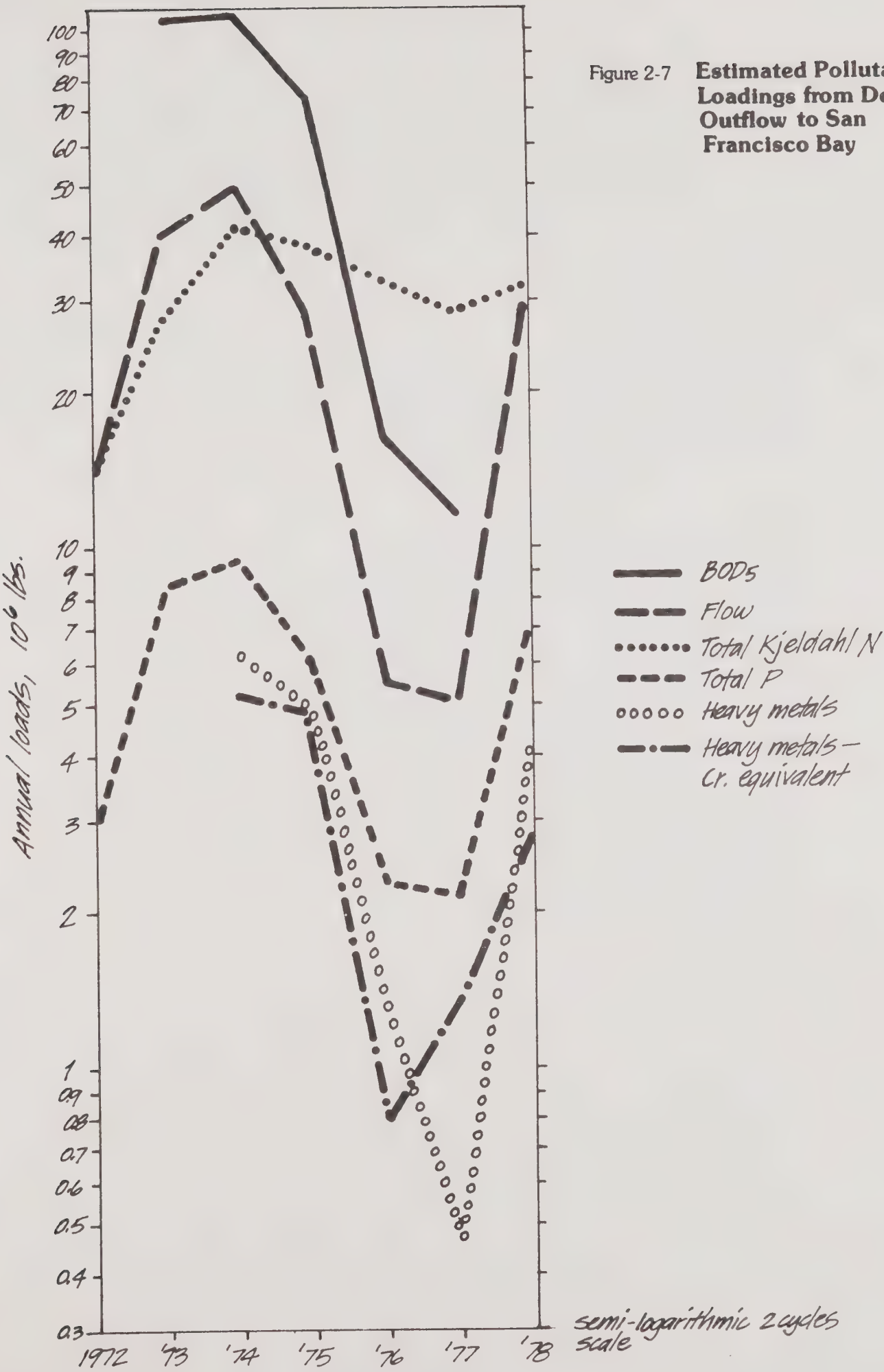


Figure 2-7 **Estimated Pollutant Loadings from Delta Outflow to San Francisco Bay**

STATUS OF THE PLAN

The regional water quality management plan was adopted by the ABAG General Assembly in June 1978 as part of the Bay Area EMP. The plan was conditionally certified by the State Water Resources Control Board (SWRCB) in September 1978, and conditionally approved by EPA in January 1979. Since the local adoption of the water quality plan, ABAG has been securing commitments from the plan's implementing agencies to undertake the responsibilities assigned them by the plan, as well as monitoring implementation of the plan.

Interagency Commitments

Federal regulations published in September 1977--late in the initial planning period--require that significant water quality management agencies listed in the Environmental Management Plan indicate their willingness to implement those actions for which they are given responsibility. ABAG staff, with the help of county lead agencies for surface runoff planning, completed the task of securing these resolutions. As of March 30, 1979 ABAG had received the appropriate commitments, including formally adopted Resolutions of Intent from the following:

- 8 of the 9 Bay Area counties, excluding Napa.
- 73 of the 84 Bay Area cities within the water quality planning boundary
- Special district implementing agencies
- State-level implementing agencies.

ABAG has requested that EPA and the SWRCB formally designate as management agencies all agencies which had given their commitment to implement the water quality plan. EPA and the SWRCB are considering this request.

Implementation Status

Management agencies have progressed towards implementing the Plan during the past year. All levels of government are participating in plan implementation.

One group of policies covers general water quality concerns such as research, data collection, and continued planning. Many of the actions under these policies are being implemented by the SWRCB and the San Francisco Bay Regional Water Quality Control Board (RWQCB). For example, these agencies have proposed that a data collection and problem assessment program for the Bay be completed by mid-1980. This program will ultimately enable the region to determine impacts on the Bay-Delta system from storm water runoff, agricultural discharges, delta outflow, and water quality improvements resulting from improved point source controls. ABAG will participate in the program to ensure its integration with continued water quality planning for the Bay.

In addition, ABAG developed, in cooperation with RWQCB, a work plan for continued water quality planning. It has been approved by the State and EPA. Many tasks involved a continuation of the surface runoff planning effort, whereas others focus on such topics as municipal wastewater treatment system needs, hazardous waste disposal and recreational

benefits accruing from water quality improvements.

One of the water quality policies calls for the re-establishment of recreational and commercial shellfish harvesting in the Bay. The State Department of Health and the State Department of Fish and Game are now working with RWQCB to determine if and under what conditions shellfish from the Bay can be safe for human consumption. This task is expected to lead to opening shellfish beds throughout the Bay for recreational and commercial harvesting.

There are four more groups of water quality policies, each having to do with a particular source or kind of water pollution. One of these is municipal wastewater. As part of the initial plan, ABAG developed a 20-year project list of needed municipal wastewater collection and treatment system needs. This list was updated in June 1979 to reflect changes in population projections prepared by ABAG, with formal adoption of the new list scheduled for September 1979. All future sewerage facilities in the Bay Area will need to be planned and implemented in accordance with this list.

Another policy in the water quality plan is to provide facilities needed for industrial wastewater treatment and disposal. The actions under the industrial wastewater policy concern both direct industrial discharge as well as industrial pretreatment of liquid wastes. These activities are all ongoing. EPA is required to prepare technology based pretreatment standards for industrial wastes discharged to municipal treatment plants. These standards will be for 65 toxic or hazardous pollutants

normally discharged by an industry in one of 21 industrial categories. By the end of this summer EPA expects to publish draft regulations for leather tanning, petroleum, textiles, and gum and wood industries. Simultaneously, EPA has published, for 27 of the 65 pollutants, draft water quality criteria that establish concentration levels at which those pollutants can cause harm, and is now evaluating public comments on those criteria. These criteria will be used in preparing State level water quality standards.

Pollution from surface runoff is also given attention by the plan. The surface runoff plan, completed by ABAG and the region's counties, lies at the heart of the water quality management plan. Implementation of ABAG's responsibilities will take place through the continuing planning efforts. This involves coordination of county planning to update the regional plan, continuation of modeling and monitoring efforts to develop a better understanding of surface runoff problems, analyzing the existing laws and ordinances for surface runoff control and working with local governments to develop appropriate amendments, and providing technical assistance to county planning.

The major portion of the initial surface runoff plan was developed by the Bay Area's counties. Implementation of the individual county plans will also proceed during the continuing planning phase, although much has already been completed. Among the highlights:

- Implementation of demonstration projects on street sweeping in Castro Valley and San Jose

- Preparation of grading and creekside ordinances in Solano County and a watercourse ordinance in Alameda County
- Improvements in consideration of "best management practices" for water quality purposes by agencies in Sonoma County
- Increased monitoring of reservoirs, surface and ground waters in Santa Clara County
- Expansion of erosion control efforts in rural portions of San Mateo County
- Addition of surface runoff-related water quality considerations to the project review process in Napa County
- Re-development of agricultural practices, which affect surface runoff water quality in Solano County
- Development of a State-sponsored program in oil recycling and funding for litter control.

The last group of policies in the water quality management plan address several miscellaneous, but generally considered more minor sources of water pollution. One policy seeks to reduce sewage pollution from vessels and housboats. Implementation has been promised by SWRCB. Public marina and harbor owners have agreed to accept responsibility for any newly required pump-out and toilet facilities at their docks. The U.S. Coast Guard is providing information to the boating public on marine sanitation device programs, as called for by the plan.

Another "miscellaneous source" policy calls for improving wastewater disposal practices in unsewered areas. The plan's actions to establish regionwide standards for on-site disposal systems and to begin a program of on-site system inspection and maintenance were adopted by the RWQCB. This should have a major effect in solving the region's problems with on-site systems. Research on alternatives and improvements continues at the State level.

The third and final "miscellaneous source" policy in the plan covers oil and chemical spills. To implement one of this policy's actions, EPA recently published new regulations for spills of hazardous substances. The U.S. Coast Guard has completed a new study and found that expanded radar coverage in the Carquinez Straits is not warranted at this time. County Offices of Emergency Services and local fire departments have cooperated to improve spill containment and cleanup capabilities. One of this policy's actions is to undertake a study of potentially hazardous inland spills. It has not been completed because of EPA's decision not to provide funding for it in 1979-80.

PROJECTED TRENDS

It may be expected that Bay water quality would steadily improve as a result of decreases in pollutants entering the Bay from sewage treatment facilities, boats and surface runoff. Quantification of this improvement must await the development and compilation of a more comprehensive data base. This is an immediate objective of the State and ABAG.

Ongoing programs for the control of municipal and industrial wastewater discharges will continue to be the major way to reduce pollutants in the Bay and Delta. Preparation of a municipal wastewater treatment facilities needs list by ABAG will ensure consistency of sizing of those facilities with current population projections and other major capital expenditures in the region. New requirements for the installation of vessel holding tank pump-out facilities at each marina will provide

additional incentive for the installation of holding tanks on private pleasure craft. New minimum uniform guidelines for septic tank construction and operation will augment the work done by county health departments to protect local surface and groundwaters.

The major source of fresh water and several pollutants to the Bay and Delta is the combined outflow from the Sacramento and San Joaquin Rivers, commonly referred to as Delta outflow. Approximately 85% of the fresh water entering San Francisco Bay comes through the Delta. For this reason, Delta outflow plays an important role in determining the future water quality of San Francisco Bay.

Recently completed studies (see References 2 and 3) have presented interesting findings regarding the possible effects of changes in Delta outflow upon the physical and biological condition of the Bay. These findings are summarized below.

(1) Based upon 50 years of record from 1922 to 1971, the median flow of fresh water from the Delta was 18.4 million acre-feet per year. Under proposed State and Federal projects with existing facilities, the median flow in 1980 would be reduced to 9.3 million acre-feet. Increasing fresh water demands and a Peripheral Canal would reduce the median to 7.8 million acre-feet in 1990.

(2) Annual Delta outflows of less than 4 million acre-feet, which never occurred in the 1922-1971 period of record,

and were reached in the 1976-1977 drought, would occur in 10% of the years for the 1980 proposed development condition and 20% of the years for the 1990 condition. The frequency of high outflows would be substantially reduced.

(3) As a result of Delta outflow reductions, there will be substantial physical and chemical effects in San Francisco Bay. Salinities can be expected to increase in the northern and southern portions. Reduction in high winter flows may affect the extreme south bay. There is evidence that current winter flood flows from the Delta produce density stratification reaching into the south bay that may last four to six months and improves water circulation.

(4) Delta outflows provide most of the suspended sediment and approximately two thirds of the silicate to the Bay. Projected flow reductions could reduce silicate by 40% and concentration of suspended solids by 20 to 40% in the northern bay. These reductions may have impacts on diatom production, which depends on silicate, and phytoplankton growth, which may be related to the clarity of the water.

Other relationships of Delta outflow to biological productivity in the Bay remain to be proven. Low

outflows have produced more marine organisms and fewer fresh water organisms in the western Suisun Bay. Reduced outflows could: decrease discharges of organic detritus, a basic component of the aquatic food chain; move the faunal break--the line between marine and freshwater microorganisms--from Carquinez Strait to Suisun Bay; change the location and feeding habits of waterfowl, shorebirds and fish that depend upon these microorganisms; increase salinity in a large area that now supports opossum shrimp; and affect the food supplies of major commercial species of fish in San Pablo and Suisun Bays and Carquinez Strait. It is most important that adequate scientific studies be undertaken to verify and quantify these impacts before significant changes have occurred.

A proposed project that has generated much controversy and public discussion is the San Joaquin Valley agricultural drain. Often referred to as the San Luis Drain, it would collect salt laden drainage waters from farmlands in the San Joaquin Valley and discharge them somewhere in the Delta. The most recent recommendations for the drain were released in draft form by the Interagency Drainage Program in January 1979. A 290-mile long drain could discharge up to 219 billion gallons per year in the vicinity of Chipps Island. Freshwater marshes along the drain may remove nutrients from the

flow but the drainage is expected to contain common salts, minor quantities of arsenic and boron, and some nutrients. Mathematical modeling predicts little impact would result in the Delta from these discharges, although there are substantial concerns shared by many that drain discharges combined with reduced Delta outflows may prove harmful, that nutrients may produce algal blooms, and that toxic agricultural chemicals may be improperly discharged into the drain. As of this writing, legislation has been introduced in Sacramento to authorize the construction of the drain. Approval is not expected this year because of these unresolved issues.

FUTURE WORK

ABAG's application for continuing planning funds authorized under Section 208 of the Federal Clean Water Act has been approved by EPA. During 1979-1980, water quality planning in the Bay Area will emphasize major areas. These are:

- Development and implementation of surface runoff controls through ordinances and public works practices. These controls are being developed jointly by ABAG and participating counties.

- Development of an integrated approach to research and monitoring of water quality problems. Coordination among the many agencies involved in water quality activities will help

provide answers to often puzzling and little understood phenomena in the Bay.

- Establishment of criteria for the safe recreational and commercial harvesting of shellfish from the Bay. The RWQCB, Departments of Health and Fish and Game, and ABAG will investigate two major shellfish beds to assess the sources and extent of contamination and develop methods to permit harvesting from those beds.

- ABAG will establish the capacity requirements for hazardous waste disposal for the next 20 years. This effort will tie into a Statewide program dealing with the disposal of hazardous wastes.

- The Bay Area Council of Resource Conservation Districts, working with ABAG, will prepare a program to implement the use of its "Handbook of Best Management Practices" in rural parts of the region. This handbook was developed in the initial 208 planning effort to identify appropriate surface runoff control measures for rural areas.

Long-term planning efforts in water quality will be guided by the needs of the region and EPA's planning objectives. Three long-term objectives not previously mentioned are particularly worthy of note:

- There will be a closer integration of air, water and solid

waste planning. It appears that National Pollutant Discharge Elimination System permits, now issued for wastewater discharges, will combine air pollutant emissions and solid waste disposal.

- The problem of toxic or hazardous waste disposal will receive greater attention in the future. Hundreds of new chemicals, compounds or wastes are being created annually as technology is applied to improve our standard of living. The effects of these new compounds upon the environment must be better understood and methods developed to prevent any possible negative impacts.

- Groundwater protection will be looked at more closely. Certain groundwaters in our region are now being carefully and conscientiously managed. It is intended by EPA that such management of a limited resource would be extended to all groundwaters in the region and the State.

REFERENCES

1) Naftzger, H. J., "Equivalent Heavy Metals Loading Factors," Technical Memoranda No. 7, Appendix B, San Francisco Bay Area Environmental Management Plan, June 1978.

2) J. B. Gilbert and Assoc., Effects of Outflow from the Sacramento-San Joaquin Delta on Quality of San Francisco Bay, prepared for the Contra Costa County Water Agency, November 1977.

3) J. B. Gilbert and Assoc., Report on Effects of Delta Outflow on the San Francisco Bay System, prepared for ABAG, October 1978.

WATER SUPPLY MANAGEMENT

Water supply was investigated during the preparation of the initial EMP as a result of its close relationship to water quality issues, wastewater generation, population and industrial growth, and consequent air pollutant emissions. Policies adopted by the ABAG General Assembly assigned future water supply planning tasks to other agencies; ABAG has the specific role of coordination between water supply and other environmental planning. From this perspective there are three major areas of concern: adequacy of water supplies in 1978; water consumption; and implementation of the water supply policies of the EMP.

CURRENT CONDITIONS

Water Supplies

A survey was taken of major water suppliers to determine the current conditions of water supplies in the region through 1979. It is expected that conditions encountered by these suppliers will reflect, as a whole, the regional situation.

The East Bay Municipal Utility District operates storage reservoirs in the Sierras and the East Bay. With completion of the snowmelt this summer, all reservoirs will be filled to more than normal capacity. This will more than compensate for the temporary draining of San Pablo Reservoir for repairs.

The Marin Municipal Water District reservoirs are full to 98% of capacity as of May 1979. This represents a two-year supply at pre-drought consumption rates.

As of April 1979 Lake Berryessa, which supplies water to Napa and Solano Counties was 78% full. This is equivalent to a five-year supply.

The Contra Costa Water District purchases supplies from the Bureau of Reclamation and obtains them from the Delta. On the basis of this season's rainfall, there will be no restrictions on supplies to CCCWD.

The Hetch Hetchy system, which supplies water principally to San Francisco, San Mateo and Santa Clara Counties, is at 43% of capacity as of May 1979. It is expected that the spring snowmelt in the Sierras will fill the system, providing a 1.5-year supply.

The Santa Clara Valley Water District distributes water in a complex fashion from the State Water project and local runoff to local cities and groundwater storage. Adequate supplies are expected for this year. Local reservoirs, used for groundwater recharge, range from 30% to 96% full as of May 1979.

In summary, it appears that for the balance of 1979, there are sufficient water supplies for all users, even at pre-drought consumption rates.

Water Consumption

The California Department of Water Resources maintains annual water consumption records for selected cities and water supply agencies in the region. These are presented with their reported respective consumptions from 1975 through 1978:

	Water use, billion gallons per year			
City or agency	1975	1976	1977	1978
San Francisco	37.8	37.7	26.4	28.8
San Jose	39.2	42.4	33.6	37.9
East Bay M.U.D.	76.0	81.2	48.4	59.1
Alameda County W.D.	8.8	10.0	7.3	9.2
Contra Costa County W.D.	23.2	39.0	29.2	21.7
Santa Clara	6.8	7.8	6.3	7.0
San Mateo	4.3	4.6	3.0	3.8
Daly City	2.7	2.9	2.0	2.2
Sunnyvale	7.3	8.0	5.9	7.3
Marin M.W.D.	10.3	7.1	3.7	7.2
North Marin W.D.	2.2	2.5	1.4	2.1
Total	219	244	168	186
Percent Change	-	+11.4%	-23%	-15%

Water consumption increased 11% from 1975 to 1976, but as a result of the 1976-1977 drought, dropped by 23% in comparing 1975 and 1977, and 15% in comparing 1978 to 1975. Thus, although the drought was over in 1978, there were lingering effects in the form of continuing water conservation. These water use numbers include all domestic industrial and public agency consumption in each city. However, it is interesting to look at the average water use per citizen. Using the Association's Projections 79 information, service populations were obtained for each of the selected agencies between 1975 and 1979 and summed for a total.

These populations do not correlate exactly with the exact service populations, but provide a close approximation and serve as indicators of population growth. The total annual water use for each year was then divided by the sum of the population for that year. Per capita water consumption was thus calculated to be 181 gallons per day (gpd) in 1975, 200 gpd in 1976, 137 gpd in 1977 and 151 gpd in 1978. Expressed in terms of 1975 consumption, the percentage changes were +10.5% in 1976, -24% in 1977, and -17% in 1978. Based upon 1975 data, approximately 53% of total water use in these areas is for inside and outside residential use and 47% for commercial, industrial and institutional use.

STATUS OF THE PLAN

The Water Supply Management Plan was adopted as part of the EMP by the ABAG General Assembly in June 1978. Three policies were included in the plan. However, only two of the policies were considered for and received certification and approval by SWRCB and EPA. These are Policy 1, Provide a Safe and Reliable Water Supply to all Citizens at a Minimum Monetary and Environmental Cost; and Policy 3, Encourage Safe and Effective Wastewater Reclamation. A third policy--one dealing with water conservation--was not considered by the State or EPA. Thus it has no current official status.

Implementation Status

Under the first policy, the action to establish a committee of representatives from all major water agencies in the Bay Area has been completed. This committee has met several times and is undertaking several projects, among which are an investigation of interagency water

transfers, drought contingency planning, review of State Department of Water Resources studies and safety considerations of water supplies.

The third policy encourages safe and cost-effective wastewater reclamation. The first phase of the Regional Reclamation Study has been completed by the East Bay Municipal Utility District and consultants, with the participation of State and regional agencies, including ABAG. The conclusion of this phase is that wastewater reclamation, combining the flows of major East and South Bay dischargers, could be economically competitive with the development of a major new water supply in the State. Principal uses for this reclaimed water might be irrigation in the Central Valley and/or saline water repulsion in the Delta.

The policy that was not adopted by the State or EPA encourages water saving. The actions under this policy call for retrofitting existing buildings with water savings devices, implementing water savings programs in new developments, revising building codes to incorporate water savings devices, a reclamation of water rate structures, and the encouragement of water conservation in agriculture and landscaping. This policy, developed by ABAG during the recent drought, is still viable, and the actions under it are desirable from the perspective of assuring long range water supplies and the wise management of our natural resources.

Although this policy in the EMP was not certified, certain related water conservation efforts are being implemented by the State. These include:

- Assemblyman Gualco's bill AB 380, signed by the Governor into law on April 1, 1977, which allowed the Department of Water Resources to conduct a pilot project to determine the most effective means of instituting retrofitting with water saving devices and determine probable savings that would result.

  The Department recently published a report on the pilot study--conducted in six communities. The pilot study showed the program to be cost effective, resulting in annual water savings of 1.3 billion gallons and annual energy saving equivalent to 76,000 barrels of oil.

  DWR is also conducting a study in 33 rooms of a San Francisco motel to test one conclusion in the AB 380 pilot study that people don't shower longer when using low-flow shower devices. Other tests are for the effectiveness of various devices to save water in toilets and for energy savings of shower and toilet devices. The study is expected to be concluded in the fall of 1980.

- AB 1395 amended the Health and Safety Code to require, effective January 1, 1978, the installation of low-flow water closets not exceeding 3-1/2 gallons of water per flush on all new structures employing tank-type water closets that are approved by the Department of Housing and Community Development.

- The California Energy Resources Conservation and Development Commission's regulations require all new showerheads, lavatory faucets, and sink faucets offered for sale in California be certified not to exceed specified maximum flow rates.

PROJECTED TRENDS AND FUTURE WORK

Several major trends in water supply planning and implementation are evident for the near future. The most controversial is likely to be the increased pressure from San Joaquin Valley agriculture and Southern California upon fresh waters now flowing to the Delta. This pressure comes about as a result of three major factors: 1) San Joaquin Valley farmers are seriously overdrafting their groundwater supplies in order to keep farmlands in production; 2) increased population in Southern California will require additional water supplies; and 3) Colorado River water supply will be diverted from Southern California to Arizona. At present, these demands are focusing upon a long-proposed Peripheral Canal as a key component of a system to provide more supplies to the South. Bills authorizing the construction of the canal have been considered by the Legislature for several years; provisions of the current bills have substantial opposition from competing interests throughout the State.

Locally, water supply planning will emphasize conservation of existing resources by reducing usage at the tap. Devices built into new-home plumbing systems are the first major step in a long-term trend.

Sharing of water supplies among the major distributors has the potential to slow down the growth in regional demand for water. The Department of Water Resources and several local water supply agencies are investigating the feasibility of such interties as a long-range objective.

EPA concerns about water supplies will focus on two major, related issues. The first is safety of water supplies as mandated by the Safe Drinking Water Act. More research and investigation will be conducted on major water supply systems with increased attention given to organic chemicals and minerals that may be present in some systems in minute quantities.

EPA will also be emphasizing the protection of groundwaters as major water bodies with beneficial uses. It is likely that groundwater protection and management planning may be conducted as part of the § 208 water quality planning program in subsequent years.

Although water supply planning at the regional level was conducted by ABAG as part of the initial environmental management program, § 208 funds were limited in 1979-80. Therefore, during this year ABAG's environmental management planning program does not include any regional level water supply tasks.

Chapter 3
INCORPORATING ENERGY CONSIDERATIONS INTO THE PLAN

The previous chapter updated the air quality, solid waste, water quality and water supply plans contained in the initial Environmental Management Plan. When the initial EMP was being prepared, it became more apparent that comprehensive environmental management ought to include consideration of energy resources. The environmental actions of the EMP may have direct or indirect impacts on the region's energy situation. Conversely energy-related activities (e.g., current gasoline shortage and odd-even day allocation) may have implications for the region's environmental management activities. A better understanding of the relationships between energy and environmental problems is important to integrated environmental management in the region. This chapter describes trends in the region's long-term energy demand/supply and highlights some of the concerns associated with integrating energy resources and environmental management planning. As noted later, ABAG is planning a more active role in regional energy resources planning, especially in the areas of long-term energy demand/supply assessment and energy conservation.

TRENDS IN ENERGY DEMAND/SUPPLY

The energy problem facing the Bay Area is similar to that of the rest of the State and the nation, and is easy to characterize: the low-cost, abundant, and once secure, supply of fossil fuels that have historically powered much of its economic growth and its citizens' lifestyles can no

longer keep pace with ever increasing demand. In-state oil and natural gas production began to fall short of statewide requirements in the early 1950s. Since that time, oil and gas imports have risen steadily to fill a widening gap between rising demand and a fluctuating but discernably declining domestic production. A growing dependence on these imports have made California increasingly sensitive to the direct economic effects of foreign embargoes and production cutbacks as well as to the political impacts of energy-related national policies and priorities. Beyond the problems of increased vulnerability an even more important consideration has been identified: most independent forecasts of oil and gas supplies collectively support the consensus that, even with expected new discoveries, these energy forms will serve a declining role in satisfying overall energy demand by the end of the century. Since more than 90% of California's energy is derived from oil and gas, it is apparent that the State must prepare for transition to a different energy situation.

Projecting future energy consumption patterns during this transition period is fraught with uncertainties. There are uncertainties in international politics, uncertainties in energy demand, uncertainties in the technologies currently being developed to increase energy supply, and an increasingly pluralistic society that forces delays in strategic decision-making. The forecasts presented here are based on the most recent information on energy resources relevant to the Bay Area. Most available information is not specific to the region, so in each case the smallest possible geographic unit is used. Future annual reports will contain data more specific to the Bay Area.

Natural Gas

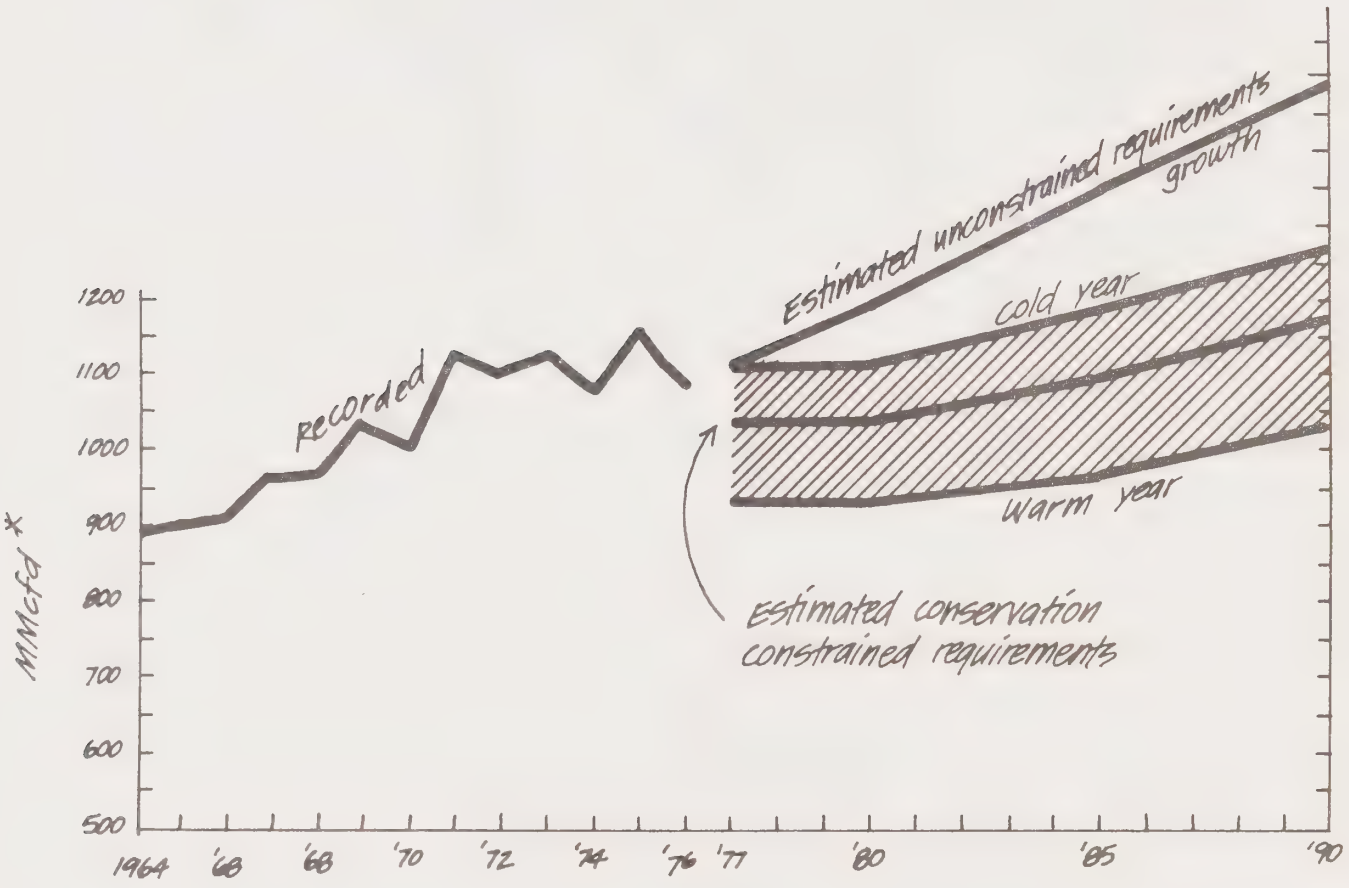
During the past 25 years, increasingly distant sources of natural gas have been developed to provide for the growing needs of California consumers. During the next two decades, this trend will continue as the companies distributing gas to the California market develop even more distant sources of gas supply. The total supply of natural gas expected to be delivered to California will continue to decline at least until the mid-1980s. The rate of that decline, as well as the point at which it will be arrested, will depend in large measure upon the prospects for conserving existing supplies, and obtaining additional supplies from both existing and new sources.

Figure 3-1 summarizes the projected residential natural gas demand for Northern California (primarily the Pacific Gas and Electric Co. service area) with and without the effects of conservation programs. Growth in residential natural gas demand is projected to be reduced almost to zero (0.2%/year) through the implementation of a number of State energy conservation programs, including:

- residential appliance standards
- residential building standards
- ceiling retrofit insulation
- night thermostat setbacks
- solar space heating/cooling and water heating

The California Public Utilities Commission has prepared forecasts of natural gas supplies under several different scenarios. The

Figure 3-1 **P1 and P2A Natural Gas Requirements for Northern California: Recorded and Estimated from 1964-1990**



Range of estimated consumption variation due to weather

*Million cubic feet per day

Source: California Public Utilities Commission

"worst-case" and "best-case" scenarios are summarized in Figure 3-2 along with the expected natural gas demand (the effects of conservation programs have been included). The worst-case, or minimum supply scenario, consists of zero supply from supplemental sources. Under this scenario, Priority 3 customers (primarily large commercial and light industrial users) would be cut off from natural gas supply by 1985. Curtailment of residential and small commercial customers (Priority 1 & 2A) would begin around 1988.

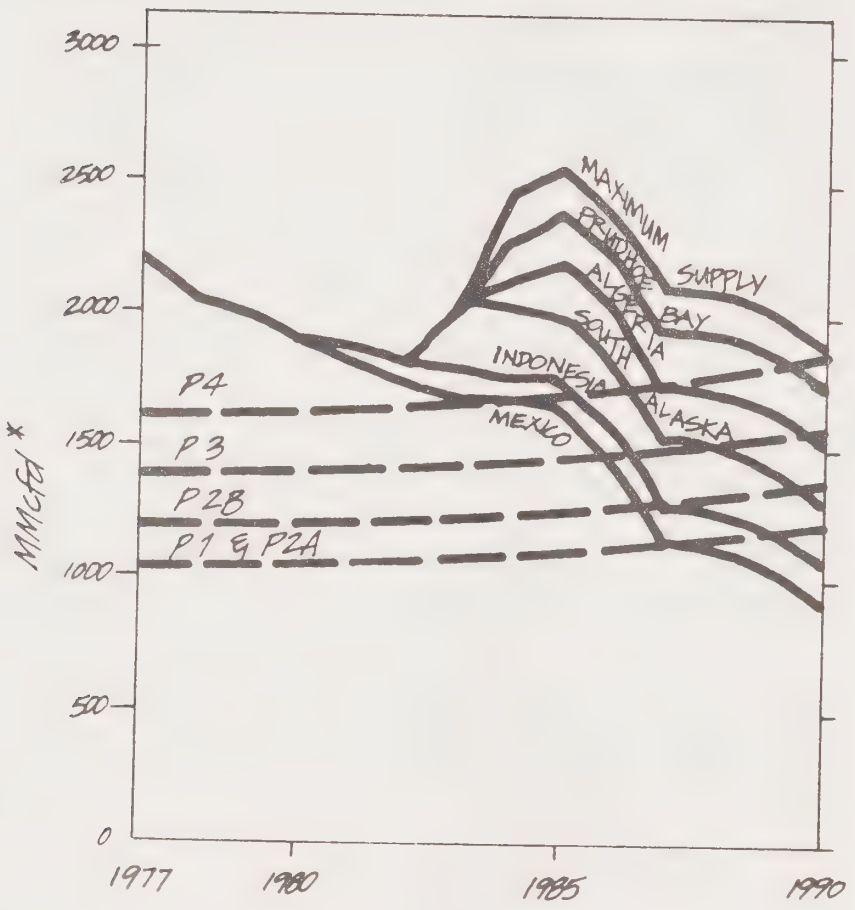
The best-case, or maximum supply scenario, includes substantial supplemental pipeline gas from Alaska and Mexico, and LNG imports from Indonesia, Southern Alaska, and Algeria. (Potential supplies from the excess Canadian "bubble" are expected to go to Southern California, which faces more severe supply difficulties than Northern California.) Under this scenario, all customers through Priority 4 (industrial) can be supplied through 1990, with additional gas available for electrical power generation (see Reference 1).

The difference between the minimum and maximum supply scenarios is thus substantial, and is a reflection of the uncertainties that abound in this area.

Petroleum

The recent cutbacks in gasoline supply experienced in the Bay Area dramatically illustrate the complexity of the petroleum supply situation. While no authoritative explanation has yet been documented for the current supply shortage, a number of contributing factors have

Figure 3-2 **Pacific Gas and Electric Co. Northern California Natural Gas Supply-Requirement Relationships**



Supply

Cumulative requirements forecasted by priority,

P1 - residential

P2A - small commercial

P2B - commercial

P3 - Large commercial & light industrial users

P4 - Heavy industrial users

* Million cubic feet per day.

Note: graphic reflects supply-requirement relationships under average temperature conditions and excludes transfers

Source: California Public Utilities Commission

been identified: a reduction in worldwide petroleum production due to the revolution in Iran; some problems in the Federal allocation scheme for distribution of gasoline; panicky motorists adding to the lines at service stations by "topping off" their fuel tanks; possible Federal reservation of supplies to meet the anticipated heating oil demand in the midwest and northeast next winter.

While this situation is commonly viewed as a short-term problem, it serves to illustrate the sensitivity of petroleum supplies to small perturbations in a variety of areas. It also suggests that short-term shortages may become a chronic problem over the next several years. An additional problem is the potential impact of short-term shortages on fuel switching (that is, using leaded gasoline in vehicles designed to run on unleaded gasoline), and the adverse consequences of such actions on air qulity improvement strategies.

From a longer range perspective, most experts are in agreement that the supply of oil is definite and is likely to run out sooner rather than later. The uncertainty concerns the time when demand will become constrained by the diminishing supply. The time at which this happens is dependent on future demand growth and possible actions by OPEC and other producers to limit production capacity in anticipation of these impending resource constraints. Such a point in time is a convenient fiction for the purposes of analysis; however, in the real world, mechanisms (including price) will act to bring supply and demand into balance. The point at which a nationwide resource gap emerges is critically dependent on the rate at which demand increases. Had oil

demand continued to grow at 7% per year (the rate prevailing before 1973) a resource constraint would be reached in the early 1980s. With demand growth at 3% per year, a supply gap would emerge in the 1990s while if demand growth is reduced to 1% per year beyond 1985 the gap would not emerge until after the year 2000.

Before this overall resource gap appears, the surplus producer countries (i.e., those with revenues surplus to their immediate requirements and with relatively plentiful crude oil resources--principally Saudi Arabia, Kuwait, and Abu Dhabi) are likely to decide to prolong the life of their resources by establishing production limits.

Table 3-1 summarizes the most recent forecast of petroleum refinery production in the Petroleum Allocation District for Defense area which includes California. The forecast was recently prepared for the California Energy Commission. The total forecast oil required to meet the demand is shown, together with an approximate breakdown of the mix of sources which will most likely be used to satisfy the demand. Overall, west coast petroleum refinery production is projected to increase at roughly 3% per year from 1976 to 1985, dropping to less than 1% per year from 1985 to 2000. The average growth rate from 1976 to 2000 is expected to be slightly less than 2% per year (see Reference 2).

The most significant factor in the expected decline in the petroleum demand growth rate is the Federal requirement that new automobiles exhibit progressively improved mileage characteristics, with an ultimate average fuel economy of 27.5 miles per gallon beginning in 1985.

Table 3-1 **Forecast PADD V Crude Oil Runs**

(Million barrels of crude per day [MBCD])

	1976 Actual	1980	1985	1990	1995	2000
Crude Runs[1]	2072	2580	2870	3005	3085	3165
Domestic Crude						
California	892	1084	1395	1443	1335	1275
Alaskan	146	1021	1000	1087	1275	1415
Total Domestic	1038	2105	2395	2530	2610	2690
Imported Crude						
Indonesian[2]	465	400	400	400	400	400
Mid East	378	75	75	75	75	75
Other	191	0	0	0	0	0
Total Foreign	1034	475	475	475	475	475

(1) Forecast crude runs equal total crude required to meet 100% of forecast PADD V refined products demand.

(2) Or other low sulfur crude oils.

SOURCE: Arthur D. Little, Inc., estimates. (Reference 2)

Electrical Energy

A wide variation in independent forecasts provide the basis for a great deal of uncertainty about the intermediate-to-long range future of electricity demand in California. This uncertainty underlies much of the current debate in the state regarding the amount of additional electrical generating capacity needed to serve future requirements.

It is generally agreed that some new capacity will be necessary to meet future California electric energy requirements. If a significant increase in capacity is required, it will come from either nuclear or coal. Existing oil and natural gas supplies will be diverted to uses where alternative fuels cannot be accommodated. Newer sources of energy such as solar or geothermal, while increasing in use, are believed incapable of providing more than a supportive role in meeting substantially increased energy demand over the next several decades.

The role of nuclear energy in satisfying future electricity demand remains highly uncertain. Recent events at the nuclear power facility at Three Mile Island (near Harrisburg, Pennsylvania), the temporary shutdown of the Rancho Seco reactor operated by the Sacramento Municipal Utility District, and demonstrations opposing the initiation of operation of PG&E's Diablo Canyon nuclear facility leave the future of nuclear power for the Bay Area in doubt.

PG&E has also proposed a 1600 megawatt direct fired coal power plant which would begin operation in 1984-85. Of four alternative sites

proposed by PG&E, one site in Solano County near Collinsville appears to present the fewest problems. The most significant problems to be overcome are the potential air quality and solid waste disposal problems anticipated from direct coal-fired facilities. The California Air Resource Board has proposed strict control requirements for the proposed plant, which is still undergoing Energy Commission review.

The California Energy Commission is preparing an updated electrical energy demand forecast for PG&E. The Commission's previously adopted demand forecast of 3.4% per year was substantially reduced from previous PG&E estimates of 6% to 7% per year (see Reference 3). This lower demand projection, if fulfilled, would substantially lower PG&E's projected overall fuel requirements. However, at 3.4% per year, it appears that substantial generating capacity will be required if that demand is to be met. The revised forecast currently under preparation is likely to range from 2% to 3% (see Reference 4).

Table 3-2 summarizes PG&E's present and projected 1985 fossil fueled electric generating capacity within the Bay Area (see Reference 5). Conventional steam turbines are expected to continue to use residual fuel oil as their primary fuel, at least through 1985. Projected combined cycle and combustion turbine units will probably use distillate oil as primary fuel. No long range projection is shown due to uncertainties in facility sites and fuel policies.

FUTURE WORK

As noted previously, some of the actions recommended in the EMP, if

Table 3-2 **PG&E's Fossil Fueled Electrical Generating Capacity Within the San Francisco Bay Area**

	Avg Full Load Capacity (MWe)	
Unit Type	1976	1985
Conventional Oil or Gas Fired Steam Turbine	4140	4264
Combustion Turbine (Peaking)	259	990
Combined Cycle	0	1220
Coal*		1600*

*PG&E expects the facilities to be located in the Sacramento Valley; they are shown here because one of the proposed sites is in the San Francisco Bay Area.

Source: Pacific Gas & Electric Company 20-year Resource Plan submitted to California Energy Commission, Forms R-3A and R-4A, September, 1977

implemented, will have direct or indirect impacts on energy. On the other hand, energy-related activities may affect the regional environmental management. The interrelationships of energy and environmental problems may be technical, institutional, social, or economical. ABAG has received joint funding from the Environmental Protection Agency and the Department of Energy to develop an integrated energy conservation/environmental planning process in the San Francisco Bay Area over the next two years. The work will be in three principal areas:

- Developing regional energy demand forecasting methods and economic impact analysis techniques for alternative supply scenarios;

- Evaluating the energy impacts of regional environmental management policies;

- Developing a regional energy conservation plan that is directed toward actions available to local governments and regional agencies.

The energy conservation plan is expected to be similar in form and level of detail to the other components of the Environmental Management Plan, and will be integrated with it.

REFERENCES

1. California Public Utilities Commission, Staff Report on the Decline in Natural Gas Available to the California Distribution Utilities from Traditional Supply Sources and the Need for and Timing of Supplemental Supply Projects, February 1978.

2. Arthur D. Little, Inc. California Clean Fuels Study, prepared for California Energy Resources Conservation and Development Commission and California Air Resources Board, CAEC-003, April 1978.

3. California Energy Commission, California Energy Trends and Choices - Summary, 1977 Biennial Report of the State Energy Commission, 1977.

4. California Energy Commission, Energy Choices for California...A Look Ahead, March 1979.

5. Pacific Gas and Electric Company, Twenty Year Resource Plan, form number R-4A, September 1977.

Chapter 4

INTEGRATED REGIONAL PLANNING: THE TECHNICAL ISSUES

The nature of environmental and energy problems has changed significantly in the past several decades. Certain issues have been effectively dealt with while new ones have arisen. The complexity of the remaining problems increases even as substantial improvements and progress are made. Intermedia impacts between different environmental programs (e.g., air quality control impacts on water quality, solid waste and energy) continue to be very poorly understood. Third and fourth generation control technologies are not only increasingly expensive, but their justification is frequently questioned on grounds of technical feasibility and relative cost-effectiveness. More information is needed to assess cost-benefit relationships, socio-economic impacts and public acceptability of many controversial strategies. While the outlook for environmental quality and energy resources can be viewed with optimism, much work remains to be done and a continued commitment is still needed.

BASIC ENVIRONMENTAL AND ENERGY RESOURCES ISSUES

Basic issues remain the focus of ongoing environmental quality and energy resources planning activities in the Bay Area. These include:

- Degree of control required to attain various environmental goals and objectives. A direct corollary to this is the most cost-effective and publicly acceptable means of achieving the

agreed upon level of control.

- Balance of supply and demand for water and energy resources. An important part of this issue is the ability to accurately project future water and energy needs.

- Role of conservation in reducing the demand for water and energy resources. Similarly the importance of resource recovery and recycling in reducing the solid waste management problems.

- Emphasis on "prevention" versus "cure" for air and water pollution control. Stated differently, this means the extent to which air and water pollution control can be achieved through direct emission limitations and discharge requirements must be balanced with best management practices and changes in personal habits and lifestyle that may aggravate environmental problems.

INTERMEDIA IMPACTS (ALIAS INTEGRATED ENVIRONMENTAL MANAGEMENT)

A variety of direct and indirect, as well as obvious and not so obvious relationships exist between environmental programs. For example, it is obvious that a direct relationship exists between the population in an urban area and the air and water quality problems that exist. Less obvious is the relationship (if any) between improved street sweeping practices and the Dungeness crab fishing industry in the bay. Very simply, our detailed understanding of the many inter-media impacts that

exist among different environmental and energy programs is limited.

The interrelationships between environmental and energy programs can be described in various dimensions--physical, institutional/governmental, and socio-economic. Physically, many relationships exist. For example:

- More stringent air pollution control technologies may increase waste water treatment and/or solid waste management requirements.

- Very advanced air and water pollution control facilities may require substantially more energy resources than less advanced control technologies.

- Certain solid waste management practices can be energy consumptive whereas others are designed to produce energy.

Institutionally, the many single or general purpose agencies which are involved in environmental issues, makes governmental decision-making very complex. Myriad agencies at different levels of government involved in planning, implementation, administration and enforcement have made it difficult to formulate integrated and rational public policy. Industry and the general public are unsure where final authority and accountability for environmental decision-making rests. An attitude exists that the various governmental agencies are not efficiently organized to deal with complex environmental problems.

Environmental decision-making must recognize the socio-economic impacts of proposed control strategies. It has been repeatedly demonstrated that technically effective but publicly unacceptable programs do not get implemented. The need to consider and balance environmental objectives with a host of other local decisions--housing, transportation, jobs, economic development--is clear. The difficult task is achieving local consensus on what the appropriate balance should be. Many controls for air and water quality have been or are proposed for implementation in the Bay Area. Two characteristics of scheduled or future controls are: the relative cost-effectiveness of the remaining controls is increasing and the application of the controls to smaller and larger numbers of sources. Large, discrete point source controls are increasingly being supplemented with controls from smaller, discrete point or area sources of pollution. With increasing cost-effectiveness, important issues are the cost-benefit relationship, adverse socio-economic impacts (especially on small business), and equity concerns. More information is needed on the potential impacts of future controls on the increasing number of private concerns affected.

NEED FOR INTEGRATED ENVIRONMENTAL MANAGEMENT

During the EMP development, ABAG put considerable efforts into integration of the various component management plans. Such an integrated approach assured that decisions to meet goals for one element would not impair efforts to meet other element's objectives. It was also most efficient to carry out the public participation process of the various component plans using an integrated time schedule and a similar format. Institutional coordination between a number of single-purpose

and multiple-purpose agencies at all levels of government--local, regional, State, and Federal--was one of the major tasks involved. The adoption by local governments of the San Francisco Bay Area EMP was a significant first step in integrated environmental management.

Updates to the EMP will continue to stress the integrated environmental approach of the initial planning process. Efforts will be continued to improve the understanding of the relationships between environmental programs and to identify the need for more informed and efficient public decision-making on environmental matters. Future work will continue to focus on technical analysis and comprehensive impact assessment of various component plans, as well as intergovernmental coordination and cooperation. The major technical issues that may be involved in continuing integrated environmental management are briefly addressed in the remaining sections of this chapter. Institutional issues, intergovernmental coordination and public participation are discussed in Chapter 5.

TECHNICAL ISSUES

Meaningful integration of environmental activities must include technical analysis, comprehensive impact assessment, and institutional coordination and cooperation. Technical analysis and comprehensive impact assessment help to better understand the interrelationships between environmental problems. A host of basic, and frequently controversial, technical issues remain despite adoption of the EMP. Broadly categorized, these technical issues range from data and analysis needs to environmental assessment procedures and techniques. Sound

future policies for protecting the Bay Area's environment will depend on a better understanding of the technical issues identified.

Data Needs

A variety of quantitative data needs exists, as noted in the original EMP. These include:

- Data on surface runoff for problem identification (e.g., types and magnitude of surface runoff pollution)
- Data on water quality in the Bay, especially reliable time-series data on specific heavy metals, pesticides, and other toxic materials
- Data on aerial fallout (air pollution) contributions to the water quality problem--sources, magnitude
- Data on heavy-duty truck travel--age, mileage, diurnal cycles, truck type--for air and water pollution estimates
- Data on Bay Area meteorology, particularly in the vertical dimension to improve the validation of air quality modeling efforts
- Data on hazardous and toxic wastes to facilitate more comprehensive inventories of these materials

Without improved sources of data, the technical justification for standard setting is severely limited, whether it be effluent or emission discharge limits or ambient environmental standards.

Another data concern is the consistency for format of collected data. Neither problem is trivial, although the tendency has always been to overlook the magnitude of these problems and assume the technical personnel will adequately deal with them. As environmental problems become more subtle and interrelated, the problems of obtaining consistent and properly formatted data will undoubtedly increase.

Analysis Needs

Environmental analysis requires accurate, easily understandable and policy-sensitive tools. Data requirements vary widely, as discussed above. An important analysis need is models that deal with complex environmental interrelationships, e.g., impact of heavy metal exhaust emissions from motor vehicles on water quality. The lack of such analytical methodologies reflects a lack of technical understanding of important environmental relationships. Another area of need is the ability to analyze regional energy supply and demands. Currently, no consistent methodology exists for preparing regional forecast of energy.

The value of using both simple and complex environmental models for analyzing alternative controls and future growth scenarios is these tools allow a systematic, comprehensive, and objective means of assessing public policy options. As knowledge concerning environmental relationships improves, the need for more refined analysis tools also increases.

Assessment Needs

Conducting comprehensive environmental assessment is a difficult task. A contributing factor to the problem has been previously noted--limitations of existing analysis tools to undertake technically sound and defensible analysis. Beyond the direct environmental impacts of proposed programs, the lack of adequate data and analysis tools also severely constrains the assessment process. The lack of understanding how complex urban environments interrelate makes it difficult to

evaluate how proposed control strategies will affect housing, jobs, transportation and economic development issues.

More specifically, additional cost-benefit and least-cost analysis is needed to improve the the decision-making process. At all levels of analysis--local, State, Federal--the ability to more fully document direct and indirect costs as well as assess a full range of benefits is desirable. Such information should be well integrated into any standard setting process and in the development of subsequent plans to achieve the standards established.

Uncertainty

Forecasting the future, whether it is population, employment, emissions, or environmental quality, has uncertainty that must be recognized. In future updates of the EMP, a variety of assumptions need to be made regarding how the region will grow, how much pollutants will be generated, and how the pollutants generated will be dispersed in the environment. To deal with the uncertainties inherent in projections, a highly visible and open planning process, which had been successfully used in the development of the initial EMP, will be used. All assumptions and uncertainties will be explicity identified and discussed; as much objectivity and openness will be ensured as possible.

In reality, the interaction of numerous forces over time--economic, demographic, environmental, political, and energy resources, to name a few--determine the eventual future of the Bay Area, its people, environment, growth and activities. The projections made in the initial

EMP simply reflected the most likely future of environmental quality in the region under the assumptions used. Substantial changes in Bay Area's growth and/or development trends, or occurence of unexpected events would alter the projections.

Since the development of the EMP, many events have occurred that need to be examined for their impacts. Proposition 13, the development of new technologies, decisions made now on environmental and energy policies, e.g., new stationary source control regulations adopted by the BAAQMD and the current gasoline shortage, can and will affect future environmental quality in the Bay Area. The continuing planning process will enable ABAG to update the EMP as growth trends change and/or new data become available, therefore, minimizing the effects of uncertainties inherent in the projections on decision-making.

REGIONAL DEVELOPMENT ISSUES

The conditions of environmental quality and energy resources are largely affected by the levels and distribution of human activities in the region. Human activities--land use, transportation, housing and economic development--affect the amounts of pollutants generated and energy consumed. In the EMP, the region's environmental quality was estimated based on the projections of population, housing, land uses, employment, and economic development provided in ABAG's Series 3 projections. Recently, ABAG has updated its projections of population, housing, land uses, employment and economic development for the region in its draft report, Projections 79.

Projections of Regional Activity

- Population

Future populations projected for each of the nine counties in the Bay Area are shown in Table 4-1. As can be seen, the Bay Area population is projected to grow to 6.15 million by the year 2000, compared to a 1975 population of 4.83 million. This is nearly identical to the population projection used in the initial plan. Stated differently, Projections 79 does not change the total regional population projection. The future distribution of population within the region is changed, however.

At present, most of the region's population concentrates around the bay. The majority of projected growth from 1975 to 2000 is in the outlying areas such as Santa Rosa, Vallejo, Fairfield, Vacaville, and the Walnut Creek/Concord area, while a number of areas adjacent to the Bay can expect population decreases.

In terms of growth from 1975 to 1990, Santa Clara is projected to be the leader with an increase of 221,000 people, followed by Contra Costa with 168,000 people. Two North Bay counties (Solano and Sonoma) show relatively large increases of 135,000 and 105,000 people, respectively. San Francisco is projected to lose people until 1990, with a decline of approximately 33,000 people. However, from 1990 to 2000 a modest increase of 8,000 is projected.

Table 4-1 **Projections 79: Housing Units, Employment at Place of Work, and Population (in 1000s)**

A. LEVELS

COUNTY	OCCUPIED HOUSING UNITS			EMPLOYMENT AT PLACE OF WORK			TOTAL POPULATION		
	1975	1990	2000	1975	1990	2000	1975	1990	2000
ALAMEDA	404.3	491.8	551.2	434.3	537.6	578.5	1,094.4	1,181.5	1,263.4
CONTRA COSTA	201.7	302.8	343.8	160.0	200.2	226.7	582.8	750.4	844.8
MARIN	79.2	104.6	116.2	58.1	68.5	73.9	216.1	266.0	293.6
NAPA	32.6	44.5	48.2	29.5	36.5	40.4	90.0	109.6	118.1
SAN FRANCISCO	299.4	315.8	327.8	495.5	620.8	647.2	672.7	639.8	647.8
SAN MATEO	209.2	245.9	269.9	225.2	269.6	282.7	578.2	615.0	655.6
SANTA CLARA	392.4	539.6	609.8	508.3	734.7	795.7	1,169.7	1,390.6	1,513.1
SOLANO	62.3	133.5	162.8	51.6	69.9	79.8	186.3	321.6	379.3
SONOMA	89.0	144.9	183.7	77.5	114.5	135.2	245.4	350.8	435.6
REGION	1,770.0	2,323.5	2,613.4	2,040.0	2,652.4	2,860.1	4,835.4	5,625.4	6,151.3

B. GROWTH INCREMENTS

COUNTY	OCCUPIED HOUSING UNITS		EMPLOYMENT AT PLACE OF WORK		TOTAL POPULATION	
	1975-1990	1990-2000	1975-1990	1990-2000	1975-1990	1990-2000
ALAMEDA	87.5	59.4	103.3	40.9	87.1	81.9
CONTRA COSTA	101.1	41.0	40.2	26.5	167.6	94.4
MARIN	25.4	11.6	10.4	5.4	49.9	27.6
NAPA	11.9	3.7	7.0	3.9	19.6	8.5
SAN FRANCISCO	16.4	12.0	125.3	26.4	-32.9	8.0
SAN MATEO	36.7	24.0	44.4	13.1	36.9	40.6
SANTA CLARA	147.2	70.2	226.4	61.0	220.9	122.5
SOLANO	71.2	29.3	18.3	9.9	135.3	57.7
SONOMA	55.9	38.8	37.0	20.7	105.4	84.8
REGION	553.5	289.9	612.4	207.7	790.0	525.9

Table 4-1 **(continued)**

C. AVERAGE ANNUAL PERCENTAGE GROWTH RATES

COUNTY	OCCUPIED HOUSING UNITS		EMPLOYMENT AT PLACE OF WORK		TOTAL POPULATION	
	1975-1990	1990-2000	1975-1990	1990-2000	1975-1990	1990-2000
ALAMEDA	1.4	1.1	1.4	0.7	0.5	0.7
CONTRA COSTA	2.7	1.3	1.5	1.2	1.7	1.2
MARIN	1.9	1.0	1.4	0.8	1.4	1.0
NAPA	3.0	0.8	1.6	1.0	1.3	0.7
SAN FRANCISCO	0.3	0.4	1.5	0.4	-0.3	0.1
SAN MATEO	1.1	0.9	1.2	0.5	0.4	0.6
SANTA CLARA	2.1	1.2	2.3	0.8	1.1	0.8
SOLANO	5.2	2.0	1.9	1.3	3.7	1.7
SONOMA	2.5	2.4	2.6	1.7	2.4	2.2
REGION	1.8	1.2	1.7	0.8	1.0	0.9

Source: ABAG, Projections 79

Households--or occupied housing units--are projected to grow at a faster annual rate than population. From 1975 to 1990 households are projected to grow at an average annual rate of 1.8% while population is projected to grow at a 1% rate. Compared another way, population is projected to increase by 27% from 1975 to 2000, compared to a 48% increased projected for households.

• Housing

The growth in total number of housing units projected for each of the nine counties is also shown in Table 4-1. For the Bay Area as a whole, the total number of occupied housing units is projected to increase from 1,770,000 in 1975 to 2,323,500 in 1990. Santa Clara county will realize the largest growth from 1975 to 1990, followed by Contra Costa, Solano and Sonoma. San Francisco is projected to have modest increases in housing units. Solano County shows the highest growth rate in housing from 1975 to 1990. From 1990 to 2000, the increase in housing units is projected to be modest--approximately 381,000 units in the region.

• Employment and Economic Development

Table 4-1 also shows the projected growth in total number of employment for the Bay Area counties. The total employment in the region is projected to increase from 2,040,000 in 1975 to 2,652,400 in 1990. This represents an average annual growth rate of 1.7%, compared with 1% for population. The growth rate of employment from 1990 to 2000 is comparable to the growth rate of population.

In 1975, Santa Clara led in total employment with 508,000 jobs followed

closely by San Francisco with 495,000. Alameda was next with 434,000, and San Mateo had 225,000 jobs. From 1975 to 1990 it is no surprise that Santa Clara is projected to have the largest increase with 226,000 jobs, due to its continued growth in electronics and related industries. The county is followed by San Francisco with 125,000 and Alameda with 103,000. After 1990, Santa Clara is expected to remain the leader followed by Alameda and then Contra Costa and San Francisco.

Wage and salary employment is projected to expand from 1.9 million to 2.8 million over the period 1975-2000 (see Table 4-2). This is an annual average growth rate of 1.5%, somewhat lower than the 2% rate experienced over the period 1960-1975. These growth patterns are part of overall national trends showing increasing automation in manufacturing and slowdowns in growth of population and income. The Bay Area is expected to actually improve its relative position in the U.S. economy, with increasing shares of employment in key growth industries.

The services sector is projected to be the fastest growing sector, at an annual average rate of 2%. This reflects long-term shifts in the region's economic structure, paralleling those of the nation.

Although the manufacturing sector is only projected to grow at a rate of 1.2% per year, the specific manufacturing activities producing high technology products such as electronic components, computers and scientific instruments are projected to grow at a substantially higher rate. Food processing, projected to decline in employment, runs counter to the general trends projected for manufacturing industries.

Table 4-2 **Projected Employment by Major Industry Division in the Bay Area, 1975-2000 (in 1000s)**

INDUSTRY DIVISION	1975	1990	2000
Agriculture	26.0	20.1	17.1
Manufacturing	351.6	458.6	473.8
Wholesale and Retail Trade	404.1	545.7	587.1
Finance, Insurance and Real Estate	135.2	185.4	200.1
Services	385.4	578.1	634.5
Government	413.6	533.7	613.6
Other[a]	229.2	293.8	307.3
Total Wage and Salary Workers	1945.1	2615.4	2833.5
Employed Residents[b]	2040.0	2652.4	2860.1

[a]Includes Mining, Construction, Transportation, Communications and Utilities

[b]Includes self-employed and adjusts for multiple job holding

Source: ABAG, Projections 79

Finance, insurance, real estate, government, trade and other industries are expected to show moderate rates of growth, close to the overall average.

- Land Uses

The 1975 land uses and the projected land use development for the region are shown in Table 4-3. Urbanization of vacant land across the Bay Region is projected to proceed at a rapid rate in the 1980s and 1990s. This projection assumes that local land development policy, as in force in 1976, will remain essentially unchanged in the face of regionwide growth trends in population and employment at least up to 1990. By the year 2000 a land area of about 500 square miles--roughly equivalent to the already developed areas of San Francisco, Marin, Alameda, Contra Costa and Santa Clara Counties combined--could be expected to develop. This seemingly large figure is counterbalanced by the area that would be expected to remain undeveloped: about 5,800 square miles, including existing urban parks, urban areas zoned as open space or committed for public acquisition, agricultural preserves, county, state and federal recreation areas, and remote wilderness lands.

- Residential Density

Residential density in the region is projected to decline significantly over the period to the year 2000. Although higher density developments are becoming more common in the suburban areas, the overall trend continues downward as the supply of flat, more easily built-on land is depleted.

Table 4-3 **Urbanized and Vacant Land by Subregional Area: 1975 and 2000 (in thousands of acres)**

Subregional Area	Total Land Area	1975				1975 to 2000	2000	
		URBANIZED LAND AREA	Vacant Land Designated			NEW URBAN DEVELOPMENT	URBANIZED LAND AREA	Remaining Vacant
			Industrial	Residential & Related [a]	Other Vacant			
North Bay	2,378.9	93.7	26.6	111.4	2,147.2	111.7	205.4	2,175.1
East Bay	950.2	157.4	18.9	87.7	686.2	94.7	252.1	697.6
West Bay	315.3	83.2	3.7	31.7	196.7	34.1	117.3	198.1
South Bay	837.0	107.8	13.0	78.3	637.9	82.0	189.8	647.2
Region	4,481.4	442.1	62.2	309.1	3,668.0	322.5	764.6	3,718.1

a. Includes streets, local commercial uses, and developed public lands such as schools, hospitals and offices.

Note: Totals may not add due to rounding.

Source: ABAG, Projections 79

A historical housing mix accounts for the great varieties that already exist on the ground in such diverse areas as older San Francisco and newer Napa County. San Francisco has more than 30 units per residential acre due to a higher mixture of multi-family housing and commercial uses. Napa has less than 5 units per acre now--more typical of suburban areas both old and new. The 1975 regionwide on-the-ground average is slightly more than 8 units per residential acre. Excluding San Francisco, the remaining eight-county average is about 7 units per acre.

Projected densities of 3 to 4 units per acre for new development are a regionwide average that also accounts for a considerable variety in local zoning ordinances. For example some hill areas of Oakland provide for new development densities as low as about 3 units per acre. On the other hand, new development densities of 20 to 35 units per acre are not uncommon for special sites in San Jose. The projected lower average densities of 3 to 4 units per acre for new development would decrease the overall density of the region from the current level of about 8 units per acre to about 6 units per acre.

Concerns about the continuous trend to lower residential density range from the consumption of vacant land as valued open space to the costs of providing urban services to such extensive areas. The approximately 500,000 added households projected to 1990 would occupy about 162,000 acres of vacant land (not accounting for streets, parks and other related new development). Expressing this another way, the additional 500,000 units projected would occupy more than twice the amount of land

currently occupied by the same number of units in 1975, even excluding San Francisco type densities the magnitude of San Francisco's.

The typically lower densities of newer housing development are in response not only to desires for more spacious living, but also to contemporary safety requirements in areas of steep slopes, flood plains, etc. It is estimated that more than 50,000 acres, or about 23% of the regionwide developable urban area land supply, is located in such sensitive development areas where higher densities might not be appropriate.

The Unresolved Development Issues

As stated previously, the Bay Area population is projected to grow to 6.15 million by the year 2000 compared to approximately 5 million people today. If these trends continue, we'll have almost a million more people in the next 20 years--like adding two new cities the size of San Francisco and Oakland. These population trends, coupled with a dynamic and growing Bay Area economy--more than 800,000 additional jobs by the year 2000--will have significant impacts on the continuing environmental and energy planning programs in the region. Balance between the region's environmental and energy goals with other objectives including housing, transportation, employment, and general public and social services will be an increasingly important issue in the years to come. Some of the development isues that may have important implications for the region's environmental and energy planning are summarized below.

- Availability of Suitable Land for Housing Development

A 1976 survey of current local development policies showed that local governments can only accommodate about 60% of the expected demand for housing units by the year 2000. Looking at it another way, available residential land will be essentially used up some time between 1985 and 1990. This will create a severe housing shortage, thus increasing the already rapid escalation of housing prices, unless development policies are adjusted.

- Decreased Residential Densities

Residential densities in the region are projected to decline significantly over the period from 1979 to the year 2000. Although higher density developments are common in more urbanized areas, the overall trend is projected to continue downward as the supply of flat, more easily built-on land is depleted. The implications that vacant land will be used at a faster rate and the costs of providing services to such new areas will be increased.

- Infill Development

Except for a few communities, the potential for infill development as expressed in local development policies is relatively insignificant. Infill development refers to construction in already urbanized areas where vacant land may have been bypassed, or where redevelopment--public or private--is possible. Several important features of this type of development are that public services exist, or are nearby, and generally higher densities can result in a more efficient use of land.

• Transportation-Related Environmental and Energy Problems

The pattern of development of jobs and housing has important implications for transportation, environmental and energy planning. Over the past several decades, the suburbanization of housing in the Bay Area has lengthened commutes, increased the time spent in the automobile, worsened congestion and air pollution, increased dependence on the automobile and consumed more and more gasoline. The trends indicate that these patterns are continuing, with housing being located further from jobs. Many of the problems cited above are only expected to worsen. Transit, which now carries a small proportion of Bay Area commuters, will have to be augmented to meet increasing transit demands as the automobile becomes a less viable form of transportation because of energy considerations and the physical capacity of our highway system.

• Adequate Public Services

With Proposition 13 limiting the amount of revenues from residential development, serious questions are being raised as to how local jurisdiction will finance adequate public services for both new and existing residents. Other issues concern the effect of this law on commercial and industrial development. At a time when the need for housing is so critical, issues of financing place severe pressure on communities to slow down and re-evaluate their development plans. This places further strain on Bay Area residents, particularly low-income families, to find adequate housing. The financing picture is far from settled after the passage of Proposition 13. Although it appears that continuing State assistance to jurisdictions will be possible, other

initiatives affecting State and local revenue raising capability are also being promoted. Thus, fiscal analysis of proposed developments will be even more important in the future.

• Need for Efficient Use of Land

With the financing of urban services--particularly the extension of new services--becoming increasingly uncertain, communities will have to re-examine their local plans to determine the most efficient forms of development in the future. Increasing attention will be given to the use of existing public services, creative financing schemes, higher densities, and the use of community volunteers.

• Development Versus Air Pollution Controls

In the area of industrial and commercial development, a great deal of concern has been voiced over the potential impacts of air quality regulations on economic growth in the Bay Area. In particular, the New Source Review (NSR) Rule implemented by the Bay Area Air Quality Management District, which was included as a necessary element of the 1979 Bay Area Air Quality Plan, stands as a potential barrier to expansion of certain polluting industries. Despite the fact that more than 80% of the employment in the Bay Area is unrelated to significant sources of air pollution, and thus not directly affected by the regulations, the impacts of the NSR rule may still be substantial. The growth allowance incorporated in the air quality plan is a means for accommodating new industrial growth while also protecting the health of Bay Area residents. The process by which this growth allowance will be used will be developed as part of the continuing air quality planning

process.

• Development Versus Availability of Wastewater Treatment Facilities

ABAG recently updated the 20-year project list of municipal wastewater facilities needs in the region. The projects on the list of reflect expansions, additions and new facilities currently determined to be necessary to accommodate the anticipated growth in the region over the next twenty-one years. In preparing the list, each of the projects is evaluated in terms of its consistency with other regional objectives including development policy, environmental quality, economic growth, housing and others. The projects on the list will be eligible for applying Federal grant up to 87.5 % of the construction cost. As mandated by the Federal Clean Water Act, this 20-year project list is to be updated annually. This process provides for the region's needs for wastewater treatment in an orderly fashion without either artificial constraints or inducement to growth.

Integration of the EMP with the Regional Plan

Although environmental management planning is one of ABAG's major programs, it must be integrated into the Regional Plan so that its relationship with other planning objectives can be clearly seen. Substantial efforts have been made to ensure the consistency of the Environmental Management Plan with other elements of the Regional Plan. In 1978, ABAG updated the Regional Plan for the San Francisco Bay Area to help steer different planning programs toward consistency with one another. In the 1978 Regional Plan, all past ABAG policies are grouped according to seven regional planning objectives: Housing, Environmental

Quality, Economic Development, Safety, Recreation, Transportation and Health. The Housing Chapter of the Regional Plan comprises the objectives, policies and actions of the Regional Housing Plan. The Environmental Quality Chapter contains the EMP's objectives, policies and actions for air and water quality, water supply and solid waste management. The format of the Regional Plan was expressly designed so that actions in one chapter of the plan that are inconsistent with other regional objectives can be easily identified. Once identified these differences can then be resolved in the next annual plan amendment process by revising or adding new policies and actions to appropriate sections of the plan.

Following approval of the EMP in June 1978, the Regional Planning Committee reviewed a summary of the the impacts of the four component plans on other regional objectives. The committee concluded that although beneficial impacts were identified in almost all policy areas, there were a number of potentially adverse impacts on existing policies, particularly those for housing and economic development. Many of these impacts were cited in public comments during the EMP approval process.

Acting on RPC's recommendation, the Executive Board directed that the inconsistencies between the EMP and other plan elements be reconciled in the 1978-79 amendment process. At the same time the Work Program and Coordination Committee assigned highest work program priorities to strengthening ABAG's economic development capability and implementing the Regional Housing Plan. Following these two directives, the Comprehensive Planning Program for 1978-79 has concentrated on bringing

environmental quality measures into better balance with employment, housing and industrial development objectives.

Major accomplishments from the adoption of the EMP to date include:

- Regional Plan Amendment Program

Before the General Assembly for approval at its fall 1979 meeting is a comprehensive set of recommended amendments to all seven "Regional Objectives" chapters of the 1978 Regional Plan. The amendments consist of actions that ABAG can take in its three key functions of service to member governments, advocacy, and plan and project review, to encourage and promote consistency and balance among regional objectives for housing, environmental quality, economic development, safety, recreation, transportation, health and equal opportunity.

- Economic Development Program

With a grant from the Economic Development Administration of the Department of Commerce, ABAG began an economic development program aimed at identifying the key economic development issues facing the Bay Area and determining ABAG's appropriate role in addresing them. Issue papers are being prepared on factors affecting investments in the region (including environmental regulations), major economic development problems facing local governments and the key issues that can or should receive attention in the coming few years.

In a parallel effort, ABAG and the Bay Area Council are jointly preparing a number of reports. The first, to be released shortly, will

highlight the basic facts about the region's economy and the key industries affecting the Bay Area's economic future. Economic development problems of urbanizing rural areas, preliminary findings on the impact of Proposition 13 on economic activities in the region, and ways to simplify permit procedures will be the subjects of other reports.

The business community, public and private economic development organizations throughout the Bay Area, local governments and the public will be involved in commenting on these papers and reports and in recommending the direction that economic policy development in FY 1979-80 should take.

- Housing Program

Adverse effects of environmental control measures on housing supply and costs are likely to fall especially heavily on low- and moderate-income households. Expanding housing opportunities for these people has been the focus of this year's housing plan implementation effort. The major objective has been preparation of an approvable (by the U.S. Department of Housing and Urban Development) Areawide Housing Opportunity Plan (AHOP). An approved AHOP will bring bonus allocations to the region from augmenting housing opportunities for persons eligible for Federal assistance. In April 1979, aided by a small technical assistance grant from HUD, a cooperative project was begun with three cities that have had difficulty in finding sites for lower-income housing. In this project, to be concluded this fall, ABAG will assist the cities, in reviewing for possible adoption inclusionary land use measures (e.g.,

land banking, below market rate density bonuses, etc.,) to help meet lower-income housing needs.

The Cities of San Francisco and Oakland joined ABAG in putting on a conference on government's role in responding to displacement of low- and moderate-income families resulting from public and private actions. The Conference was held in San Francisco in June.

Chapter 5
INSTITUTIONAL ISSUES, INTERGOVERNMENTAL COORDINATION AND PUBLIC PARTICIPATION

The San Francisco Bay Area is one of the most governmentally complex of any of the nation's metropolitan areas. As of January 1979, its 5 million residents lived in 9 counties, ranging in size from Santa Clara's 1.2 million to Napa's 92,000. An estimated 85% of the region's population lived in the Bay Area's 93 cities, ranging in size from San Francisco's 659,600 to Colma's 500. Forty-seven of the 93 cities have less than 25,000 residents. Together, those 47 cities have less than 10% of the region's total population.

In addition to cities and counties, there are many special districts concerned with a wide variety of functions ranging from environmental control to transit to street lighting. Among the Bay Area's 825 special districts, roughly one quarter have direct or indirect environmental management responsibilities. Additionally, there are a score of agencies with subregional (portions of 2 or more counties) and regional jurisdictions in the Bay Area. Some of these are service delivery agencies, others are planning agencies; and others perform regulatory functions.

Many of these agencies and special districts were actively involved in the development of the Environmental Management Plan. Adoption of the initial plan was a significant milestone in intergovernmental coordination in the region.

Because of the complexity of government in the region, however, institutional cooperation and coordination in environmental management will remain formidable challenges to the Bay Area. Chapter 4 described technical and regional development issues for integrated environmental planning and management. A remaining set of issues hampering integrated environmental decision-making are institutional ones. Although substantial progress on initial plan implementation and continuing environmental planning has occurred, more progress in coordinated environmental decision-making could be made.

ENSURING INITIAL PLAN IMPLEMENTATION

Components of the Environmental Management Plan must, by provisions of various Federal laws, be reviewed and revised periodically to take into account changing conditions in the region. Designation of a lead planning agency and securing management agreements to implement the initial plan are two important steps in ensuring plan implementation.

Designation of Lead Planning Agency

The Environmental Management Plan was developed by a number of State, regional and local agencies over a three-year period. ABAG was designated as the lead agency in this effort by a number of separate actions on the part of Federal and State agencies.

Near the end of the development of the EMP, the California Air Resources Board designated ABAG as the lead agency for preparation of the regional air quality plan required under § 172 of the Clean Air Act Amendments of

1977. The designation, plus the requirement that ABAG formally coordinate its activities with the Bay Area Air Quality Management District and the Metropolitan Transportation Commission, was a recognition of the partnership that had been developed to prepare the air quality portion of the initial EMP. In June 1978, the three agencies executed a three-way memorandum of agreement for the preparation of the non-attainment area plan. This plan, developed by the three agencies, with assistance from the Air Resources Board and the California Department of Transportation, was adopted by ABAG's General Assembly on January 13, 1979. The agencies have also agreed upon a work program for air quality planning assisted § 175 funds from the Clean Air Act.

A similar type of agreement would be desirable for the continuing water quality planning process. The EMP called for a joint continuing water quality planning process, including the establishment of a water quality planning staff similar to the air quality plan's Joint Technical Staff. State certification of ABAG as the designated planning agency for continuing 208 planning in the region occurred in September 1978. Over the past several months, the Association and the Regional Water Quality Control Board have agreed on a water quality planning program for the next phase of Federally assisted water quality planning in the region. EPA has certified the initial plan, and has awarded the Bay Area--through ABAG--more than than $1.5 million in continuing water quality planning funds. This includes funds directed to the State Water Resources Control Board and the Regional Water Quality Control Boards. ABAG will attempt to ensure a coordinated water quality planning program

for the region, but this will require more formalized cooperation from the State and Regional Boards, with continuing assistance and oversight of EPA.

Continuing regional solid waste management planning responsibilities were assigned to ABAG by the Legislature when it enacted SB 424 in 1977 (Chapter 689 Statutes of 1977). The State Solid Waste Management Board (SSWMB), in carrying out responsibilities assigned to it under the Resource Conservation and Recovery Act (RCRA) of 1976, identified the Bay Area as a regional planning area for solid waste management in November 1977. The board in April 1978 designated ABAG as the regional solid waste management planning agency under RCRA. To date, however, no RCRA funds have been allocated to the Bay Area for regional planning purposes. Neither the SSWMB nor the Department of Health Services has acted on the Solid Waste plan, as required by State law, as explained in Chapter 2.

Intergovernmental Management Agreements

Another measure of progress in environmental management is determining whether agencies involved are willing to carry out responsibilities assigned in the EMP to them. As described in Chapter 2, virtually all agencies assigned to carry out water quality actions in the initial plan have indicated a willingness to do so. Federal law requires that actions contained in the air quality plan be legally enforceable. Therefore, it is essential to demonstrate a commitment to carry out plan actions on the part of the agencies responsible. The Metropolitan Transportation Commission, acting on control measures for the initial

plan, adopted a resolution on March 22, 1978, underscoring MTC's commitment to actions in the plan assigned to it. In December 1978, as preparation of the 1979 Bay Area Air Quality Plan near completion, MTC reaffirmed its commitment to the plan and its continuing planning process by adopting other resolutions on portions of the plan directly related to MTC's planning and implementation responsibilities.

The Bay Area Air Quality Management District Board of Directors had accepted a staff report recommending stationary source controls proposed by the air quality plan prior to ABAG's final action on the initial plan. Later, as the plan was modified to cover carbon monoxide and total suspended particulates, the district was actively involved. On March 21, 1979, the board adopted a resolution indicating the intention to require all reasonably available stationary source controls be implemented as expeditiously as practicable. The board in April 1979 also supported proposed modifications to the air quality plan proposed to the ABAG Executive Board to accommodate Air Resources Board comments and made possible by the change in the photochemical oxidant standard to a less stringent standard for ozone.

In water supply, the initial plan's major recommendation involving intergovernmental coordination was for the formation of a voluntary regionwide Water Management Coordination Committee, which was to meet informally to consider regionally significant water supply issues. Shortly after the June 1978 ABAG General Assembly, the major water districts in the region formed the Bay Area Water Resources Council. The council has met several times. The council's activities was

described previously in Chapter 2.

Institutional arrangements for solid waste mangement were well in place prior to development of the initial regional solid waste mangement plan. As a result, the initial regional plan provided for implementation of virtually all of its control measures by existing management agencies. Continuing regional solid waste management planning responsibilities were assigned to ABAG by the Legislature when it enacted SB 424 in 1977.

REDUCING BARRIERS TO INTEGRATED PLANNING

EPA funded the development of the initial plan primarily with a large initial grant with a well-structured work program. Other funding from Federal, State and local sources was used to support certain related tasks in the entire Environmental Management Program. The work program for developing the plan specified a schedule for the completion of separate management plans for water quality, water supply, solid waste and air quality. The work program also specified a schedule for resolving any inconsistencies among the plans, and a plan approval schedule for an integrated Environmental Management Plan.

Initial and continued designation of ABAG as the lead planning agency for a number of highly visible environmental programs has, to a certain extent, reduced the single-purpose planning approach historically used in California. Beyond the local adoption process, however, single-purpose State agencies (Air Resources Board, Department of Health Services, State Solid Waste Management Board and State Water Resources Control Board) were to review and approve the various plan elements

before the plan was submitted to EPA. These agencies, except in a few limited instances where their statutory authority extends beyond a single environmental medium, failed to consider and act upon other parts of the EMP. This may from an agency's viewpoint be desirable or proper, but may also fragment understanding of the plan at the State level. There is no systematic examination of the plan at the State regulatory or planning agency level from the perspective of integrated environmental management. Institutional resistance to integrated planning exists; certain steps to reduce this resistance can and should be taken.

Revising the State/EPA Agreement

Under Federal regulations, EPA and the State are to execute an annual agreement on Federally assisted water quality and solid waste planning. For Fiscal Year 1979, the agreement covered only water quality planning. The Regional Planning Committee of ABAG asked in September 1978 that EPA Region IX in San Francisco follow through on its suggestion that the agreement be expanded to cover water, air and solid waste management planning. Such an expansion would complement the integrated approach of the Bay Area and duplicated in varying degrees in the Los Angeles and San Diego regions.

EPA Region IX Administrator Paul DeFalco indicated in October 1978 that it is his intention to "initiate discussions on a much broader agreement" for FY 1980, "addressing all of EPA's environmental programs administered in conjunction with State programs." These include programs under the Clean Water Act, the Safe Drinking Water Act, the

Resource Conservation and Recovery Act, the Clean Air Act, and the Federal Insecticide, Fungicide and Rodenticide Act.

The 1980 State/EPA agreement is now being drafted. The second draft of the agreement is a substantial improvement over the 1979 agreement. Recognition of integrated environmental planning is made, but the agreement still fails to take into account the current roles of the areawide planning agencies and their likely future assignments. It appears the development of a comprehensive EPA/State agreement will take some years to develop given California's fragmented State environmental decision-making.

Coordinated Federal Financial Assistance

Mentioned earlier was the existence of a lack of appropriate formal procedures for State agencies to review the plan from an integrated environmental management standpoint. This also makes it difficult to support integrated planning financially. Single-purpose agencies usually ask the relevance of integrative tasks to environmental objectives of cleaning up the water or air. Such tasks include development of population projections, public participation, maintenance of a policy advisory body and technical committees, and assessment of social, economic and other environmental effects of plan recommendations. Since these tasks are common to many planning programs at the regional level and since coordinated planning is required by Federal law, planning programs should explicitly support them financially.

EPA is sponsoring legislation called the Integrated Environmental Assistance Act of 1979 to improve funding strategies for integrated environmental management. The bill represents a flexible approach to integration of EPA's media-specific environmental assistance programs. EPA was originally created to integrate environmental programs and concerns; however, media-specific legislative constraints have limited EPA's ability to deliver funds to the States in an integrated, comprehensive fashion. According to EPA, the agency has made administrative attempts to integrate the assistance programs, but, with a few exceptions, has found the administrative approach unsatisfactory. If the pending Integrated Environmental Assistance Act of 1979 passes, it will certainly benefit the Bay Area's on-going intergrated environmental management programs.

Legislative Action

The State has a history of problem solving through the creation of separate, statutorily independent agencies. Virtually all constraints to integrated environmental management and decision-making at the State and regional levels could be eliminated through State legislation. Several years ago the Legislature considered, and rejected, Governor Brown's proposed consolidation of the State's environmental regulatory agencies. It has also considered, and rejected, proposed reorganization of the Bay Area's regional decision-making structure. In the short run, such reorganizations are not likely to occur.

In the longer term, however, it is conceivable that incremental steps will be taken to improve and rationalize environmental decision-making at the regional level. For example, the State's Porter-Cologne Act of

1970 preceded the development of water quality planning legislation at the Federal level. It served to establish the basic planning and regulatory framework for water quality decision-making in the State. Because the Porter-Cologne Act preceded the Federal Water Pollution Control Act Amendments of 1972, it does not provide, as required by Federal law passed later, for a planning role by areawide agencies made up of local governments. In addition, it has not been revised to reflect planning requirements of the Federal amendments in 1972 and 1977.

An effort to revise and update the Porter-Cologne Act would help to rationalize water quality planning by the Regional Boards and the designated 208 agencies. More than that, however, it could serve to broaden the perspective of the act to ensure that water quality control efforts do not interfere with other environmental objectives. It could also provide for a truly comprehensive assessment of social, economic and environmental implications of proposed water quality improvement strategies. Similarly, State air quality and solid waste management legislation could be broadened to ensure consistency among environmental programs, and to improve the process of assessing the social, economic and environmental effects of control measures.

PUBLIC PARTICIPATION IN ENVIRONMENTAL MANAGEMENT

Governments at all levels face the difficult challenge of finding the appropriate means to implement a number of ambitious commitments set forth in legislation in the last decade. These have included cleaning up the environment, improving working conditions, protecting consumers

and ending discrimination. In responding to this challenge, numerous agencies and programs have been established.

Implementation of these ambitious programs involves significant tradeoffs and far-reaching decision-making. Implementation has also created a growing awareness of cost--in human and monetary terms. The public has begun and will continue to question how and whether these costs can be absorbed. Implementation, in other words, has made public participation a legal and philosphical requirement.

Prior to development of the initial Environmental Management Plan, ABAG officials had been convinced that many environmental laws and regulations were poorly related and sometimes conflicted. They also suspected that the general public and even many special interest groups were becoming confused and disillusioned by the increasing number of governmental agencies charged with planning for or implementing an array of environmental policies and statutes, which sometimes seemed to be in conflict.

These beliefs were the foundation for the agency's decision to advocate successfully the following solutions, in concert with a number of others, including the Administrator of EPA-Region IX:

- Instead of following the trends of other parts of the country and dealing separately with air quality, water quality and solid waste--treat them all as unified parts of environmental management (and add water supply, too).

- Ensure that the task was handled by ABAG, the one general-purpose agency owned and operated by Bay Area's local governments, and associated (but avoid domination by) an array of strong single-purpose state and regional agencies.

- Involve to the fullest extent the elected and appointed leadership of the Bay Area's local governments.

- Establish an Environmental Management Task Force (EMT) as the centerpiece of a public participation program, recognizing that public decisions cannot be made solely on technical grounds.

An extensive work program was undertaken and accomplished by the EMTF, its policy and technical advisory committees, and ABAG staff. Reports were presented to more than 150 sessions of the EMTF and its committees. Three sets of workshop roundtables were held in each of the nine counties, and additional regionwide conferences were sponsored or co-sponsored by ABAG. Finally, individual presentations were made in most of ABAG's area's local jurisdictions. Gradually, a 550-page draft EMP emerged. It described the region's environmental conditions and documented the likely impact of each policy recommendation on the area's social, environmental and economic well-being. Following release of this draft in December 1977, some 600 hours of public testimony were secured--and no fewer than 1,500 pages of comments, suggestions, and proposed changes were received.

On June 10, 1978, ABAG's member governments convened as the General Assembly and voted 71 to 5 to approve the Environmental Management Plan. This act brought to initial completion one of the largest and most inclusive public participation effort in the history of the Bay Area.

Virtually every EMTF recommendation was accepted without change by the General Assembly.

The program had directly involved approximately 15,000 persons and had reached several hundred thousand more through the new media. Most importantly, however, many new people and organizations had been brought into the ABAG decision-making process.

No major challenge was raised at the end of the program to claim that groups or sectors of the public had been neglected or barred from the process. In fact, representatives of most public and special interest groups on the EMTF attended a news conference a month before the General Assembly to express their support for the plan and their willingness to participate further.

In September 1978, the State Legislature voted unanimously for SB 2167 (Chapter 934, Statutes of 1978), which required State agencies to return the plan to ABAG if they found it did not meet Federal requirements and therefore needed modification. This bill received widespread support throughout the Bay Area and was eventually signed by the Governor despite opposition by the State agencies.

As with every program, however, there were shortcomings. ABAG intends to modify the public participation programs during the continuing planning process to respond to suggestions made by members of the EMTF Public Participation Committee surveyed over the past several months. These include:

- Detailed work programs for public participation in the continuing planning/implementation phases should include more measurable objectives. Neither ABAG's original work program nor EPA's requirements and principles for public participation in the water quality program stated objectives in quantifiable terms. Examples: "To increase awareness...To promote information exchange...To increase the understanding..." The question can reasonably be asked: By how much?

- In the initial phase, questionnaires were included in the four major summary reports and generated from 100 to 150 responses each time. These and other measurement tools need to be employed more frequently and more systematically, even if they only serve to confirm opinions expressed during public meetings and in correspondence.

- Staff and members of the EMTF Public Participation Committee (PPC) were unanimous in their opinion that news media coverage was lacking in quality and quantity. A few believe paid advertising is the only answer. In a region the size of the Bay Area this is not likely to be financially feasible. The key probably lies in localizing stories better, spending more time with broadcast and print media, and circulating more widely the clips and announcements of programs that result.

- PPC members (and probably all members of the EMTF) were overwhelmed by the amount of information presented. More effort must be expended to provide Executive Summaries and fact sheets in addition to the full reports and plan proposals.

- New public participation guidelines in the EPA water quality programs require a 45-day notification period for public hearings, with materials available for review 30 days in advance. Care must be exercised to ensure that these requirements are met. Timeliness has been a problem in the past, but generally with public meetings rather than hearings.

- The depository library program should be continued, but materials need to be updated more frequently and other places

established where publications may be picked up or reviewed.

- The Speakers' Bureau needs to be modified so that important community groups are reached on more than one or two occasions. A more systematic procedure for scheduling speeches must be instituted, and more members of advisory committees and other volunteers should be involved.

- EMTF members were supposed to keep their constituencies well-informed, and some did so extensively through newsletters and presentations. Others did not; this problem requires constant monitoring and assistance or encouragement given when needed.

- Efforts to reach all interested or affected segments of the public must be continued and enhanced through updated mailing lists and personal contacts.

- Local public participation programs should probably have been monitored more closely. Some counties did an excellent job, while others seemed to just go through the motions. Those who did best were the ones who attended an EPA training session at the start of the program.

Specific decisions made to restructure the public participation program have included:

- Revising the composition of the Regional Planning Committee, reflecting the success of the EMTF, to include public and special interest group and regional agency representation. This was the first time non-local government officials have been included on a standing ABAG policy committee.

- Strengthening the role of the Citizen Services and other ABAG committees to provide guidance in environmental planning programs.

- Restructuring the technical advisory committees to reflect the

current environmental work programs.

- Forming a Citizens' Advisory Committee (or Committees), reflecting regulations detailing new EPA public participation requirements for its environmental programs.

These actions should provide the foundation for a successful continuing environmental management program in the Bay Area.